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## The New Broad Street Station of Pennsylvania Railroad in Philadelphia.

BY JOHN C. TRAUTWINE, JR.

[WITH AN INSET.]

**Introduction.**—Scarcely a dozen years have passed since the Pennsylvania Railroad Company abandoned its use of the West Philadelphia passenger station, erected in 1876 for the accommodation of the Centennial traffic of that year, and, leaving that structure to be used as a storehouse for its passenger coaches, constructed, at a cost of two and three-quarters million dollars, its "Filbert Street Extension,"<sup>1</sup> an elevated railroad leading from West Philadelphia, across the Schuylkill River (there about 500 ft. wide), to the heart of the city at Broad and Market streets, where it erected, at a further cost of one and a half million dollars,<sup>2</sup> a combined passenger and freight station of such generous dimensions that it might have been expected to afford ample provision for the company's requirements for all time. To day sees, well on toward completion, a new terminal station, of which the passenger portion alone may be said to surround and almost conceal the site of the former combined freight and passenger stations, while corresponding changes are of course being made in the Filbert street roadbed and far more extensive changes are in contemplation for the near future, for the present traffic of more than two hundred trains each way daily taxes to its utmost the narrow passage of three lines of track crossing the Schuylkill at the Filbert street bridge. The heaviest rails used upon the extension at the time of its construction, in 1880-81, were 67 lbs. per yard. The new work and the renewals of the old are now being laid with 85-lb. rails.

Tradition credits the Town Council of Tipperary with providing, at a time when it was determined to build a new jail: 1st, that the new jail was to be built upon the site of the old jail; 2d, that the old jail was to remain in use until the new jail was completed; and, 3d, that the new jail was to be constructed out of the materials of the old one. Now, the engineering force of the Pennsylvania Railroad has so far emulated the example of its illustrious predecessors that—1st, the new station is being built upon the site of the old; 2d, the old station remains in use during the construction of the new; and, 3d, some of the material of the old station is being utilized in the construction of the new.

In the *Railroad Gazette* of Sept. 30 last the new work was briefly described, and plans were presented showing the proposed general arrangement of tracks and buildings, with details of the ground and train floors of the new headhouse; and in the issue of Oct. 21 was shown a perspective view of the new edifice as it will appear when completed, the chief feature in this view being the extension of the headhouse, now in progress. This was shown in its relation to the present headhouse (which is to remain substantially as it is, although it will practically be eclipsed by the new structure) and to the new trainshed.

With the present article are shown: fig. 1, a revised plan of the general arrangement of tracks and buildings; fig. 2, a skeleton plan of the trainshed, showing the positions of the arched trusses of the roof; fig. 3, a skeleton elevation of a normal roof truss; fig. 4, a comparative sketch showing the dimensions of the Philadelphia and Jersey City trainshed roofs; fig. 5, an elevation showing a pair of end trusses, with the framework

for the plate-glass curtain closing the shed; fig. 6, details of the supports for the ends of the horizontal wind trusses at the ends of the shed; figs. 7 and 7a, an elevation and section of the traveler used in the erection of the roof; and a series of photographic views of the work in general and of some of the details, together with diagrams of the latter.

For most of the information here presented, for facilities in visiting and photographing the work, and for the use of blueprints, etc., the writer is indebted to the courtesy of Mr. W. H. Brown, Chief Engineer; Mr. W. A. Pratt, Engineer of Bridges and Structural Iron Work, and Mr. Wm. L. Ziegler, Engineer of Construction.

**General Arrangement of Tracks and Buildings.**—Referring to the general plan, fig. 1, it will be seen that the new passenger station extends from its Broad (Fourteenth) street front 815 ft. westward to a point nearly midway between Sixteenth and Seventeenth streets, and occupies the entire width, 306 ft., between Market street on the south and Filbert street on the north. The old station extended from the same Broad street front 596 ft. 6 in. westward to the east side of Sixteenth street; and the old passenger and freight trainsheds, together with a low shed for teams, occupied the same width, 376 ft., from north to south as the new passenger trainshed alone, but the old headhouse extended from Filbert street only 193 ft. 5 in. southward toward Market street, the remaining 112 ft. 7 in. being then occupied by a block of brick buildings extending from Broad street to Fifteenth street and used chiefly as retail stores.

Upon this space is now being erected the extension of the head house, which, as shown in the perspective view published in the *Railroad Gazette* of Oct. 21, will extend also some 50 ft. beyond Fifteenth street. The South or Market street wall of this structure will be carried over Fifteenth street by a three-web box girder 10 ft. 6 in. deep, 58 ft. 1 in. long, and weighing 110,780 lbs., which has recently been placed in position. The central web plate of this girder is of  $\frac{1}{2}$ -in. iron and the two side plates each  $\frac{3}{4}$  in. The upper flange has three plates,  $30 \times \frac{3}{4}$  in., and the lower flange two plates,  $30 \times \frac{3}{4}$  in. and one  $30 \times \frac{1}{2}$  in. Each flange has also four angles,  $6 \times 4 \times \frac{3}{4}$  in., which connect it with the web plates, one on each side of the central plate and one on the outer side of each side plate. The girder is placed at the level of the top of the main story, with its lower flange 32 ft. above the street level, a portion of the wall being below it and suspended from it.

The lighter northern wall of the extension of the headhouse is carried over Fifteenth street by a two-web box girder 7 ft. 6 in. deep, and weighing 55,000 lbs. Its lower flange is 42 ft. above the street level.

**The Trainshed.**—From an engineering point of view the object of chief interest in the new station is the trainshed, which will be of 300 ft. 8 in. span from centre to centre of end pins, and 539 ft. 2½ in. long from centre to centre of end arches.<sup>3</sup>

The old freight trainsheds and shed for teams, as indicated by dotted lines in fig. 1, occupied a space 134 ft. 4 in. wide on the north side of Market street and extending from 15th to 16th street. This space now forms a portion of the site of the new passenger trainshed, but a new freight station was erected some three years ago on the north side of Market street extending westward from Seventeenth street, as shown on the plan. It is a two-story brick building, with entrances for teams from Market street, shown in the distance in figs. 24 and 25, and presents no features of engineering interest. As in the old freight station, the freight is raised to and lowered from the track floor by means of hydraulic elevators. The new freight station, exclusive of the flour warehouse, is of less extent than the old, but it must be borne in mind that the freight handled at this point is relatively but an inconsiderable portion of that brought to and shipped from Philadelphia by the company.

The floor of the passenger trainshed, placed, of course, at the level of the elevated Filbert Street Extension, is about 15 ft. above the street level, and is supported by a framework of wrought iron columns connected by plate girders. This construction will undergo but little change other than its extension westward. The space under the floor formerly served for the reception and delivery of freight, teams entering from both Market and Filbert streets. A portion of this space will now be used by the Union Transfer Company for the handling of baggage, and another by the U. S. Post Office for mail purposes.

In fig. 1 are shown, by dotted lines, the positions of the old signal tower at Seventeenth street and the adjoining turntable and mailhouse, all still in use, that of the building formerly occupied by the Adams Express Company at the northwest corner of Sixteenth and Market streets, and those of the old engine and boiler houses on the northeast corner of the same streets. The three buildings last named have recently been removed. In this plan are indicated also, by arrows, the points and directions of view of the photographic illustrations presented herewith, each arrow having affixed to it the number of the corresponding figure.

**Plan of Roof.**—As will be seen in fig. 2, representing the general plan of the roof of the trainshed, the ar-

range of the arched trusses conforms in general to that now usual in such structures, the trusses being arranged in pairs. The two arches forming a pair are 9 ft. apart from centre to centre.

Regarding the length of the roof as being divided into nine panels by the eight intermediate pairs of trusses, we note that the odd-numbered panels are crossed by lateral wind-bracing, as well as by a light diagonal bracing (not shown), designed to prevent the sagging of the purlins and described under "Roof" below. The remaining panels have only this latter bracing, and their joints are arranged with bolts in slotted holes to provide for expansion and contraction lengthwise of the roof.

The upper chords of the two arches forming a pair are connected by the iron purlins at joints Nos. 3 to 27 (see fig. 3), and by an angle iron brace at joint No. 1. The 9-ft. space between the two upper chords is thus divided into panels, each of which is crossed by a pair of diagonal braces of angle iron.

The bottom chords of the two arches forming a pair are joined by transverse struts, consisting each of two angle bars and connecting the feet of the two corresponding radial posts at the odd-numbered joints (fig. 3) from No. 1 to No. 27, inclusive. The rectangular panels thus formed between these transverse struts, the bottom chords of the purlins and the two radial posts are crossed by sway-rods of square bar iron.

The two triangular apex members at the ends of the top sections in each pair of half-arches are connected by angle iron bracing, extending from one upper chord to the other and from one lower chord to the other, in the inclined planes of the chords and consisting of two transverse and two diagonal braces for each pair of chords. The field rivet holes for this bracing are shown near the ends of the upper and lower chords in the side elevation of the apex member, fig. 22.

It will be noticed that the pairs of arches are spaced at unequal distances, ranging from 56 ft. 4½ in. to 67 ft. 1 in. from centre to centre of each pair. This inequality results partly from the location of the Sixteenth street crossing and partly from the arrangement of the existing ironwork of the floor system under the trainshed, it having been found desirable to utilize certain of the transverse girders of that system in order to secure an additional resisting moment against wind pressures. (See left-hand end of arch in fig. 3.) The pairs of arches are so spaced that the end of one of these existing girders lies midway between the feet of the two arches of each pair, and it is there securely framed into the fixed shoe (fig. 18) upon which the south end of the arch foot rests. The girder, a short distance back from the shoe, rests upon and is secured to two iron columns about 10 ft. high and 10 ft. apart, connected by diagonal bracing so as to form a rigid square. This arrangement, in connection with the resisting moment of the anchor bolts by which the shoe is held down, provides ample resistance against any possible wind stresses and obviates the necessity of giving unwieldy dimensions to the piers supporting the feet of the arches. See also in fig. 23.

Along the south or Market street side of the trainshed, the brick walls outside of the truss will be carried up to the level of the shoulder or hip at the top of joint No. 27 (see fig. 3), where the arch proper joins the bottom section, while on the north or Filbert street side the masonry will extend only about 2 ft. above the feet of the bottom sections, above which level a metal sheathing will extend to the top of joint No. 27.

**Design of Roof Trusses.**—A comparison of figs. 3 and 5 will show that the arched trusses of the new passenger trainshed cover in one span, the space formerly occupied by two passenger sheds of 87 ft. ½ in. and 85 ft. respectively, two freight sheds of 47 ft. each (which, however, have been used for passenger trains during the last three years), and a shed about 40 ft. wide, for the accommodation of teams delivering and receiving freight at the street level below the train floor.

The arches are of 300 ft. 8 in. span between centres of end pins, and 108 ft. 6 in. high from centre of bottom chord to centre of crown pin, and the roof is about 140 ft. high from the station floor (or 155 ft. from the street level) to the peak of the lantern. The arches resemble, in their general features, those built by the Pencoyd works and erected by the railroad company over its Jersey City passenger station in 1891-92.

It will be noticed that these arched trusses may be regarded as consisting simply of three members, viz. two inclined rafters and a horizontal chord, like the simplest possible form of roof truss. The arching of the rafters and the bracing between their curved upper and lower chords, serve merely to enable the rafters to sustain their loads as beams without extraneous trussing, which would, of course, encumber the space below the arches and detract from the dignity of the structure. The arches are hinged at the crown and at each foot.

In the great span (362.75 ft.) of the Machinery Hall at the Paris Exposition of 1889 and in the 368-ft. span of the Manufactures and Liberal Arts Building at Chicago, the bearings of the arches were at the ground level and no tie-rods were required. The foot of each arch rested, throughout its entire width, upon a pin or its equivalent, which in turn rested in a seat of corresponding dimensions. This arrangement eliminates all shearing strains and distributes the pressure of the half-arch over a very large surface.

In the Paris building the arches were widened, in the lowest 6 ft. of their length, from about 2½ to 4 ft., and

<sup>1</sup> The Filbert Street extension was opened for freight business on the 25th of April, and for passenger business on the 5th of December. —Report of the Board of Directors for the year 1891, page 128.

<sup>2</sup> These figures include cost of real estate, and that for the roadway includes the cost of the three-track iron truss bridge of three spans (140, 160, 160 ft.) across the Schuylkill at Filbert street.

<sup>3</sup> The central nave of the Machinery Hall at the Paris Exposition of 1889 was of 110.6 metres (362 ft. 9 in.) span, 1,389 ft. long, and that of the Manufactures and Liberal Arts Building at Chicago is 368 ft. span, 1,288 ft. long. No horizontal tie-rod in either case.

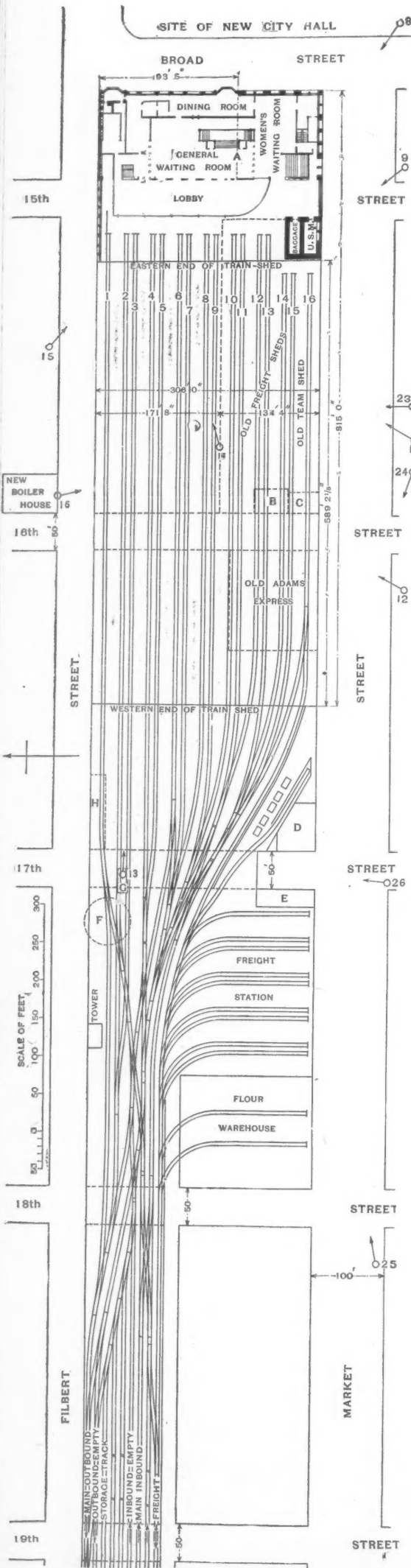


Fig. 1—New Plan of Tracks, Pennsylvania Railroad Terminal, Broad Street, Philadelphia.

A, south wall of old headhouse; B, old engines; C, old boilers; D, Adams Express building; E, freight office; F, old turntable; G, old tower; H, old malthouse.

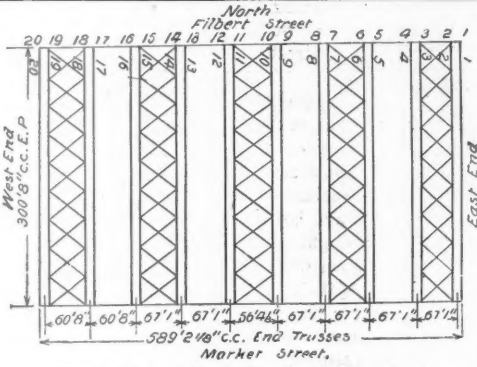


Fig. 2—Plan of Roof; Trusses of Trainshed.

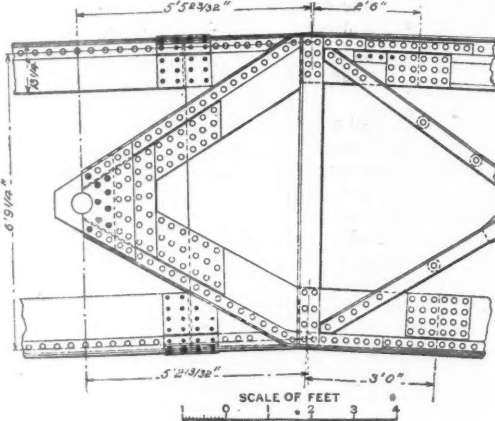


Fig. 22—Top Joint.

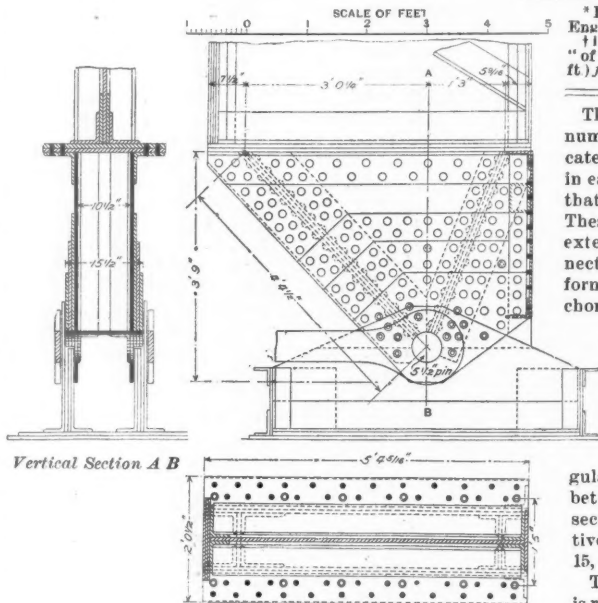


Fig. 19—Foot Member of Truss Section; Elevation and Plan.

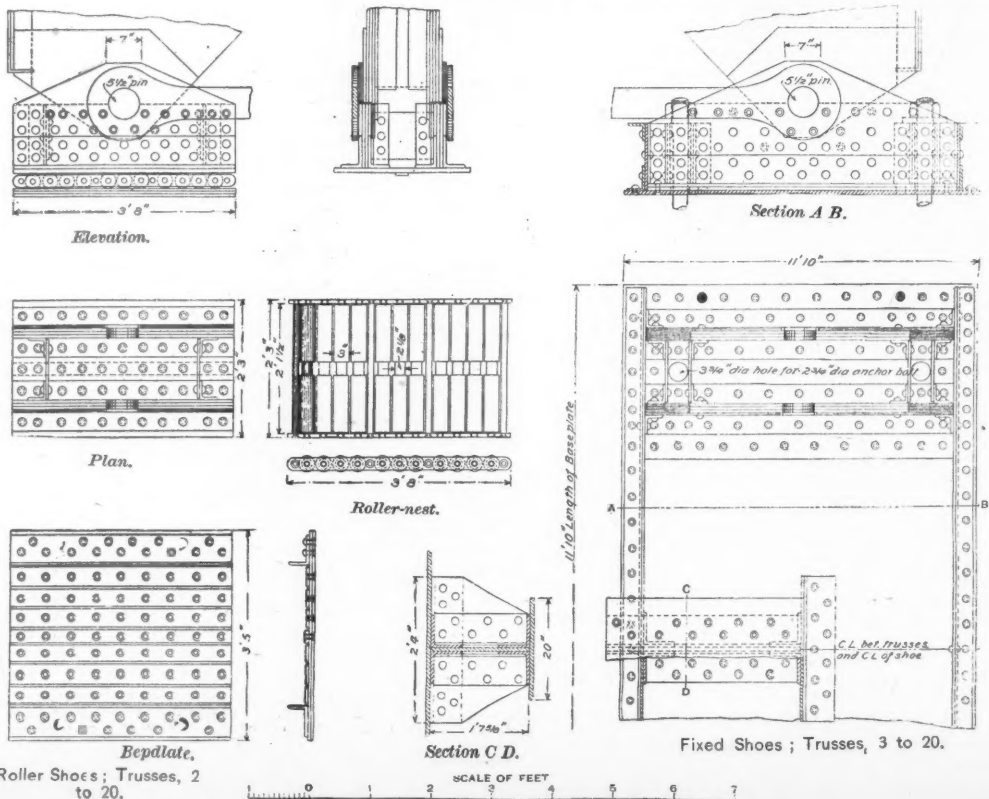


Fig. 18—Shoes, Bedplates and Roller-nests.

footed upon castings, the tops of which were rounded to the curve of a cylinder of nearly 10 in. radius. The bearing surface was nearly 18 in. wide and 4 ft. long, or, say, 6 sq. ft. in area.

Fig. 4 shows in outline an arch of this roof in comparison with those of the Jersey City station. The latter are of very nearly the same dimensions as those of the new terminal station of the Philadelphia & Reading Railroad in Philadelphia, as will be seen by the table, which gives also the length of trainshed and the area covered by it, and includes corresponding data for the Grand Central Station of the New York Central & Hudson River Railroad in New York; the St. Pancras terminal of the Midland Railway, London; the new station at Cologne, Germany (these six constituting, it is believed, the largest single-span trainsheds in existence); the Machinery Hall of the Paris Exposition and the Manufactures and Liberal Arts Building of the Columbian Exposition at Chicago.

DIMENSIONS OF CERTAIN GREAT ROOFS.

	Arches.		Roof.	
	Span.	Rise.	Length.	Area covered.
	ft. in.	ft. in.	ft. in.	sq. ft.
<b>Trainsheds.</b>				
Pennsylvania R. R., Philadelphia (Broad Street).....	300 8	108 6	589 2½	177,150
Pennsylvania R. R., Jersey City.....	252 8	90 0	652 6	164,900
Phil. & Reading R. R., Philadelphia (Market Street).....	259 0	88 3½	506 8	131,250
New York Cent. & H. R. R., New York (Grand Central).....	199 2	94 0	652 0	129,856
Midland Railway, London (St. Pancras).....	249 0	107 0	706 0*	169,400*
Cologne, Germany (nave).....	269 7	78 8	836 0	175,200
<b>Exposition Buildings.</b>				
Nave of Machinery Hall, Paris, 1889.....	362 9½	149 0	1,380 0	502,600
Nave of Manufactures and Liberal Arts Building, Chicago, 1893.....	368 0	206 0	1,268 0	466,600

\* Deduced from Proceedings, Institution of Civil Engineers, Vol. XXX., 1869-70.  
\* 110.6 metres—the French called this the arch "of 115 metres," because it measured 114.3 metres (375 ft.) from out to out.

The joints of the arches supporting the roof are numbered each way from the crown, as indicated in fig. 3, the fourteen odd-numbered joints in each half truss, from No. 1 to No. 27, dividing that portion of the half-arch into thirteen panels. These are carried by the bottom section, which extends from joint No. 27 down to the pin connection of the half-arch with the eye-bars which form the horizontal chord. The profiles of the chords of the arches are straight between adjacent panel points, except that the inner chord of the bottom section is curved to a radius of 28 ft.

The main portion of the half-arch, from the apex to joint No. 27, is divided, for erection purposes, into four sections. The first comprises the triangular half panel at the top and the four panels between joints Nos. 1 and 9, and the other three sections, of three panels each, comprise respectively the portions between joints Nos. 9 and 15, 15 and 21, and 21 and 27.

The top section, from the apex to joint No. 9, is riveted up in one piece at the mill and raised into position as a whole, as is also the bottom



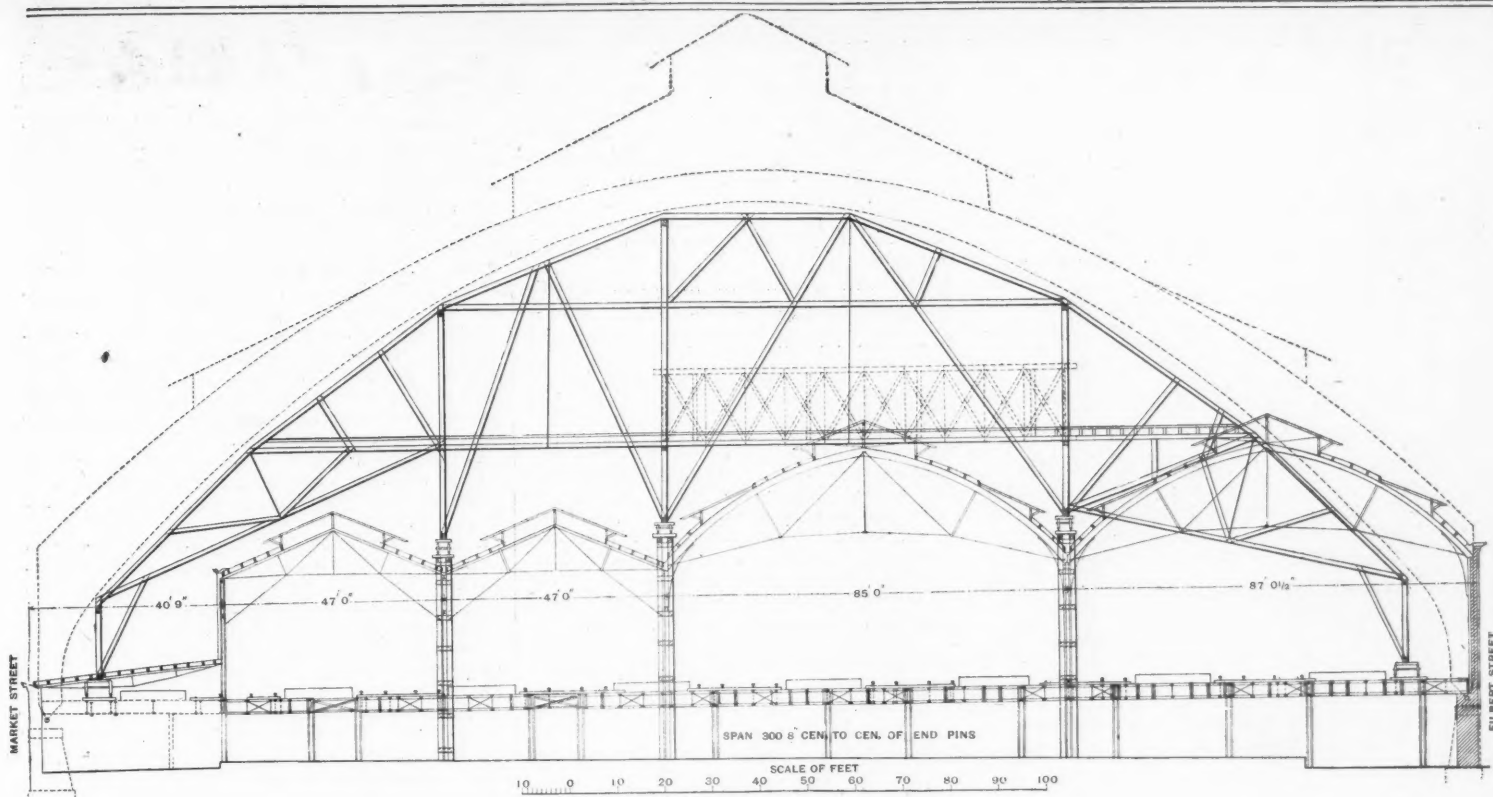


Fig. 7—Traveler, with Old and New Sheds.

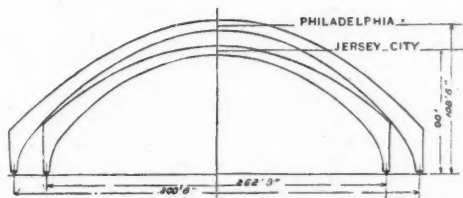


Fig. 4—Comparison of Broad Street and Jersey City Roofs.

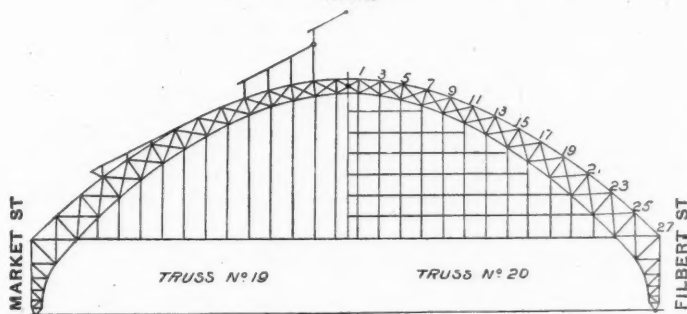
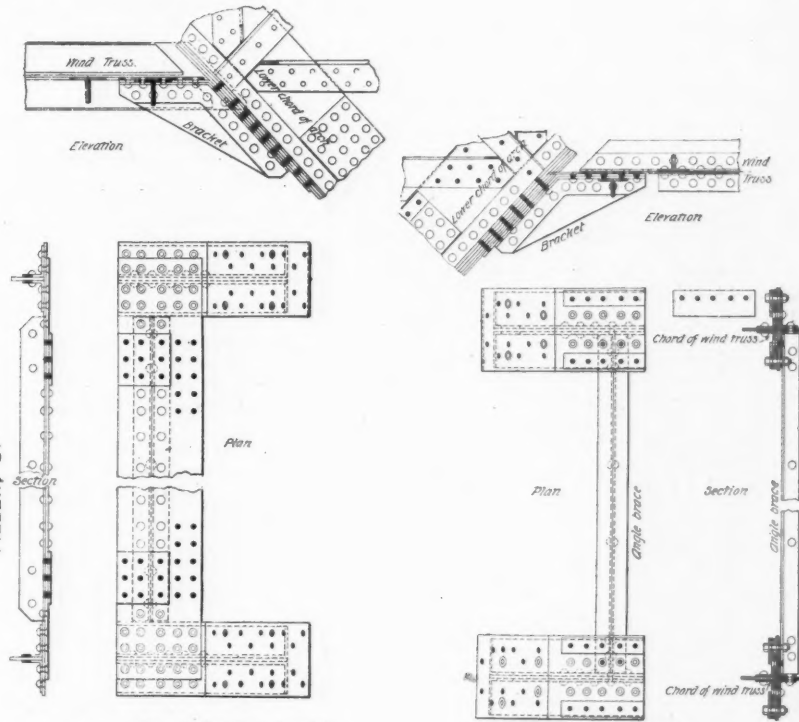


Fig. 5—Elevation of End Trusses, Viewed from Inside.



For Arches Nos. 1 and 2.

For Arches Nos. 19 and 20.

Fig. 6—Details of Supports for Horizontal Wind Trusses.

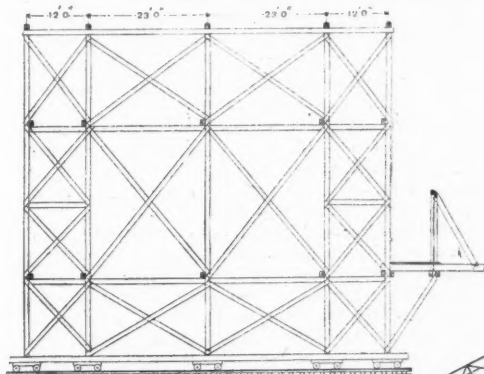


Fig. 7a—Section of Traveler.

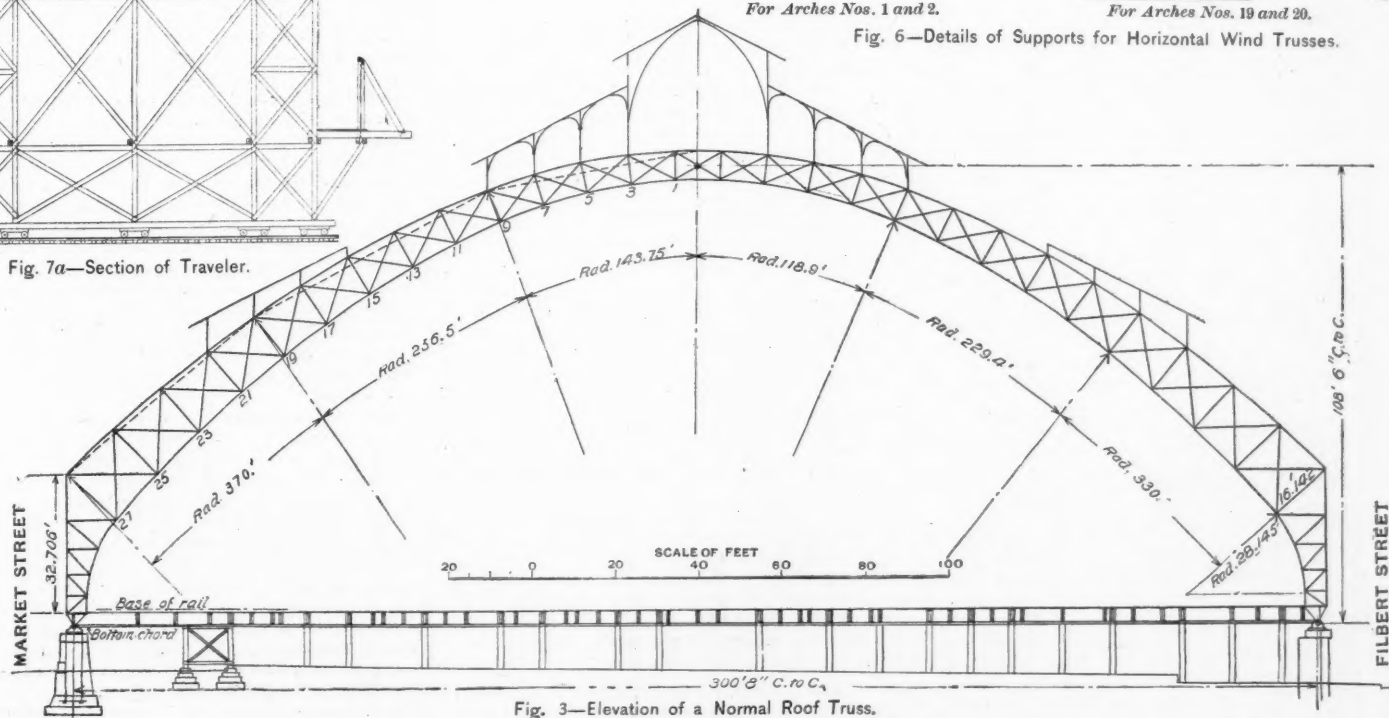


Fig. 3—Elevation of a Normal Roof Truss.

DETAILS OF THE NEW BROAD STREET STATION OF THE PENNSYLVANIA RAILROAD.

section from joint No. 27 down to the top of the triangular foot member, figs. 19 and 20.

The three remaining sections of each half-arch, between joints Nos. 9 and 27, are erected upon the traveler. Each of the two chords for each three-panel section is riveted up at the mill and erected as a whole, and the radial posts and diagonal braces are then separately put in place between them, the lower chord resting upon blocks on the upper surface of the traveler, and the upper chord remaining suspended from the boom until the bracing is temporarily bolted in place, connecting it with the bottom chord.

The time required for the erection of one pair of arches, with the purlins, etc., connecting it with the pair last erected, or the time intervening between two successive advances of the traveler, is about ten days.

As in the case of the station at Jersey City, the ironwork is being furnished by the Pencoyd Bridge and Construction Company, and erected by the railroad company itself.

The dimensions of the arches, measured from chord to chord, as seen in fig. 3, are as follows: At the floor level, 5 ft. 2½ in. wide; at the haunches, 16 ft. 1½ in. along the radial post forming joint No. 27 between the arch proper and the bottom section; at the top joint, 6 ft. 9½ in. deep.

With the exception of the pin connections at the apex and at each foot, the arches have riveted joints throughout. The wind bracing is attached by pin connections.

Arches Nos. 1 and 20, at the two ends of the trainshed, respectively, are provided with ¼-in. web plates, but merely for the purpose of closing the ends of the shed. These webs take none of the strain, but the ½-in. webs in the bottom sections of all the arches are of constructive value.

**Chords and Braces.**—The chords between joints Nos. 1 and 27 are throughout of uniform T sections, as follows:

	Web plate.	Cover plate.	Two angles.
Upper chord.....	13 × ½	12 × ¾	6 × 4 × ¼
Lower chord.....	16 × ¾	16 × ¾	6 × 4 × ¼

The chords are connected by radial posts with diagonal bracing, as indicated in fig. 3.

**Bottom Section.**—The general design of the bottom section of the arch is shown in figs. 3 and 15, and details of its foot member in figs. 17, 19 and 20.

In the normal arches the vertical back of the bottom section is 33 ft. 2 in. high, and its inner chord, from joint No. 27 down to the top of the lowest four-sided panel, is curved to a radius of 28 ft. Below that point it is straight and vertical.

The out-to-out width of the bottom section from chord to chord is 5 ft. 4 in. (horizontal) at the foot, where it joins the triangular foot-member, and 16 ft. 11 in. along its inclined top at joint No. 27.

At the back the cover plate is 12 × ¾, and the two angles 5 × 4 × ¼, as in the upper chord of the arch, and the web plate in the two upper panels is 16 × ¾.

The curved inner chord has three cover plates 16 in. wide and aggregating 1½ in. in thickness, with a splice plate ¾-in. thick for the upper panel, two angles 6 × 4 × ¼, and in the upper panel a web plate 18 × ¾. The three lower four-sided panels have solid ¾-in. web plates, and act essentially as a plate girder.

The horizontal member at the bottom of the lowest four-sided panel consists of two angles, 6 × 6 × ¾ (one on each side of the web plate); and the top member, at joint No. 27, of four angles 5 × 3½ × ¼, with a plate 10 × ¾. The other braces, which act as stiffeners, are of 6 × 4 angles.

It will be noticed that the diagonal stiffener in the lowest full panel of each bottom section is reversed in direction relatively to those of the remaining panels. The reason assigned for this is that the web stress in the lowest panel is a compression in the direction of the strut as shown. As a matter of fact, the same holds good also of most or all of the remaining panels of the bottom section, but the stresses in these are comparatively light, and the change was therefore made only in the bottom panel. Inasmuch as this panel is out of sight in the finished construction; being covered by an ornamental cast iron base, the reversal of direction was not objectionable on aesthetic grounds.

**Horizontal Chord.**—The horizontal chord of each arch consists of two series of eye-bars of acid open-hearth steel, each bar being about 30 ft. long. These eye-bars are connected by steel pins, the diameter of which, in the normal arches, is 4¼ in. The chord is suspended at intervals from the girders which support the floor of the trainshed. In the normal arches the eye-bars are 5 × 1½ in. in cross section, while in truss No. 1, which carries not only the curtain of iron and glass forming the eastern end of the trainshed, but also a part of the roof of a lobby extending from the trainshed across Fifteenth street to the head house, the chord bars are 7 × 1½ in. In truss No. 20, which sustains (in addition to the curtain) but half of a 9-ft. panel length of roof, the chord bars are 5 × 1 in. each. The details of the pin connections at the feet of the arches are shown in figs. 18 and 19. The pins are of steel 5½ in. diameter.

**Material and Weight of Arches.**—The arches proper, with their bottom sections, are of iron; the eye-bars, as already stated, of acid open-hearth steel. The weight of one entire normal arch, from one bottom pin to the other, and including therefore the two feet (which, to-

gether, weigh 6,000 lbs.), is 138,000 lbs. Adding 16,000 lbs. for the weight of the two series of eye-bars forming the horizontal chord, we have, for the weight of the entire arch, with its chord, 154,000 lbs. The weight of the framework of the entire trainshed, with its twenty arches and their horizontal chords, iron purlins and rafters and wind-bracing, is very approximately seven million pounds.

**Stresses.**—The estimated maximum tension in the horizontal chord, or compression upon the crown pin, for a normal arch, is

From dead load.....	127,000 lbs.
From snow.....	59,000 "
From wind (taken at 35 lbs. per square ft.).....	56,000 "
Total.....	242,000 "

The estimated maximum compressive strain in the horizontal chord, due to wind alone, is 113,000 lbs., but inasmuch as this is exceeded by the tensile strain due to dead load, no provision for it is necessary.

In the Jersey City roof, on the contrary, calculation gave an excess of 8,000 lbs. of compressive wind strain in the chord over the tension due to dead load, and the chord was therefore made of a rigid section, consisting of one 12-in. I-beam, the several lengths of which were spliced by plates on each side, and on top and bottom. The whole was imbedded in a mass of bituminous concrete extending under the entire floor. This arrangement, of course, prevented any lateral yielding of the chord.

In the upper panels of the arches of the Philadelphia Station both chords are in compression when the roof is uniformly loaded, the resultant of all the pressures cutting the several joints nearly midway between the chords, but in the neighborhood of joint No. 15 (see fig. 3) the line of pressure passes out through the inner or lower chord of the arch; and from this point down to the top of the triangular foot-member the inner chord is of course in compression, and the outer chord and the vertical back of the bottom section, from joint No. 27 down, are in tension.

Under any combination of circumstances, however, both flanges of the triangular foot-member (which may be regarded as the ends of the chords of the arch) are in compression, with the result that the rivets in the horizontal joint at the top of this member are never in tension.

**Skylights.**—Light is admitted, and ventilation provided for, by a central ventilator, fig. 3, of 33-ft. span, at the apex of the roof, and by four skylights, each about 33 ft. wide horizontally, one at each side of the ventilator, and one on each side of the roof between joints Nos. 15 and 21. The roof of the ventilator, which rises above the adjoining skylights, is covered like the main roof. The ventilator and the two upper skylights are continuous between arches Nos. 2 and 19, or nearly from end to end of the roof, while the other two lights are discontinuous, being interrupted by each of the ten pairs of arches.

**Roof.**—The purlins extend continuously from end to end of the roof, and are riveted to the radial posts which form joints Nos. 3 to 27. (But see "Wind Bracing at Ends of Roof" below.) The two purlins at joints Nos. 3, or immediately under the walls of the ventilator, are of the full depth of the arch at that point, or about 7 ft. They consist of an upper and a lower chord, with a double system of diagonal lacing. The purlins at the remaining joints (Nos. 4 to 27), on the contrary, are of the uniform depth of 4 ft., and have only a single system of lacing. The space 34 ft. wide and about 50 ft. long, between two pairs of arches and under the ventilator, or between the two joints Nos. 3, is left entirely open and unencumbered by framing.

The space between each two adjacent pairs of main arches (see fig. 23) is divided into three nearly equal panels by two light members, parallel to the main arches and resembling jack rafters. These so-called "purlin struts" extend downward from joint No. 3 on each side of the roof, to the level of the feet of the arches. They are intersected by, and riveted to, each of the purlins and the two systems of light framing connecting the bottom section of the arches.

The lower or vertical portions of these purlin struts are of I-section, composed of a web plate 15½ × ½ in. and four angles 3½ × 3 × ¾, without cover plates. The upper or arched portion is deeper. Its two chords, each consisting of two angles 3 × 2½ × ½ in., are joined by a single diagonal lacing of 2½ × 2½ × ¼ in. angles.

Between joints Nos. 9 and 11 and Nos. 21 and 23 (see fig. 3) the purlin struts form the perpendicular compression members of trusses parallel with the roof and lying just below it. The chords of these trusses are the purlins themselves, and the diagonal rods are of ½-in. square iron. The four systems of trusses thus formed two on each side of the roof extend from end to end of the shed.

The purlin struts, acting partly in compression but chiefly in tension, carry to these trusses the loads received by them from the purlins in the roof and from the framing between the bottom sections; and the trusses, in turn, transfer these loads to the main arches.

The roof is covered with sheet copper, laid upon a sheathing of 1½-in. tongued and grooved yellow pine, which in turn rests upon yellow pine jack rafters, the

<sup>4</sup> The tendency of the purlins to sag is shown by the lowest purlin but one in fig. 11, the photograph for which was taken before the purlin bracing for that panel of the roof had been inserted.

upper edges of which are sawed to a curve corresponding with that of the roof. The jack rafters are carried by the iron purlins.

**Glass Curtains at Ends of Shed.**—Referring to fig. 5, which represents one-half of each of the two arches (Nos. 19 and 20) forming the westernmost pair, it will be seen that from the lower chord of each of these arches is suspended a series of verticals extending down from joints Nos. 1 to 23, inclusive, to the level of lower joint No. 25, which is about 38 ft. above the bottom pins of the arches. The two series of verticals are connected by horizontal and diagonal bracing in vertical planes perpendicular to those of the arches.

In the westernmost of the two arches, No. 20, the verticals are crossed by horizontal members, which are riveted to them, and the surface of the curtain is thus divided into panels about 10 ft. square. The horizontal members have expansion joints at their ends, to allow for changes in the form of the arch.

A generally similar arrangement obtains with regard to trusses Nos. 1 and 2 at the eastern end of the roof.

The glass used is ¼-in. American ribbed glass, in sheets about 18 in. wide.

**Wind Bracing at Ends of Roof.**—The arrangements for lateral bracing between the pairs of arches, and between the two arches of each pair, have been briefly described under "Plan of Roof." In addition to this, special provision is made for resisting the pressure of the wind against the immense plane surfaces of plate glass forming the ends of the trainshed.

At each end of the roof the framework just described sustains at its foot a horizontal wind truss which abuts against the two arches at lower joint No. 25. Its ends are supported there by brackets as indicated in fig. 5 and shown in detail in fig. 6.

At the western end of the roof (trusses Nos. 19 and 20), where the end of the shed has no protection against the wind and receives no extraneous support, this truss is of fish-belly form, widening from 10 ft. 5½ in. at the ends to 16 ft. 9 in. at the middle of its span of about 260 ft.

The truss has two chords, straight between panel points, and horizontal braces by which the truss is connected with the verticals suspended from the arches. These braces divide the truss into panels, each of which is crossed by two diagonal braces. The dimensions are as follows:

Chords; web plate, 13 × ½; cover plates, 13 × ¾ (three at centre, one at ends); two angles, 6 × 4 × ¼; horizontal braces; each, two angles, 4 × 3½ × ¼; diagonal braces; at centre, each, one angle, 5 × 5 × ¾; at ends, each, one angle, 6 × 6 × ¾.

At the eastern end of the shed, under trusses Nos. 1 and 2, where the roof is in a measure protected from the wind by the headhouse, and where it is furthermore supported against wind pressure by the roof of the lobby which connects the two buildings, the wind truss has parallel chords, and its width between their centres is only that (9 ft.) between the two arches themselves. In other respects it is generally similar to that at the western end, just described.

Fig. 6 shows in detail the supports for the ends of the wind trusses. On the right is shown the support at the Market street end for arches Nos. 19 and 20 at the western end of the shed, and on the left that at the Filbert street end for arches Nos. 1 and 2 at the eastern end.

Each of the brackets upon which the ends of the wind trusses rest consists of two bent angles with a ¾-in. triangular web plate riveted between them, and a ½-in. bent cover plate. The two brackets at each end of the wind truss are connected, in the case of arches Nos. 19 and 20, by a plate 16½ × ½, stiffened by two angles 5 × 3½ × ¾. At the eastern end of the shed the plate is dispensed with and two angles 3½ × 3 × ¾ suffice to connect the two brackets of a pair.

The ends of the chords of the wind truss are provided with horizontal flanges 9 in. wide, which slide upon the horizontal tops of the brackets, and are held in place laterally and vertically by lugs bolted to the latter, as shown. The lugs at the sides take the horizontal pressure of the wind upon the curtain at the end of the shed, transmitted through the wind trusses. This pressure, upon the assumption of 35 lbs. per sq. ft., amounts, in round numbers, to 200,000 lbs. upon either end of the station, or 100,000 lbs. at each end of a wind truss.

In order to transmit this pressure safely through the structure of the trainshed to the ground, the 4-ft. purlins of joints Nos. 25 (at which level, it will be remembered, the wind trusses are supported) are stopped at arch No. 18, and the roof panel between that arch and arch No. 19 is crossed, instead, by a truss of the full depth of the main arches, which, at this point, is about 15 ft. By this means and by re-enforcing the wind-bracing in the same roof panel, as well as by using in this panel substantial trussing in place of the light longitudinal framing between the bottom sections of the other panels, the wind pressure upon the curtain at the western end of the shed is distributed between the two westernmost pairs of arches, Nos. 17-18 and Nos. 19-20; and these pairs are in themselves re-enforced by the substitution of angle iron braces, riveted together at their intersections, in place of the light square sway-bracing crossing the radial panels between the two arches of the other pairs.

**The Traveler.**—The traveler, or movable centre, used in the erection of the arches, is shown, in elevation and



in section, by fig. 7 and 7a. It will at once be noticed that it differs radically from that used at the Jersey City roof in this, that whereas at Jersey City the entire space below the roof was available for erection purposes, at Broad street the new roof had to be erected over the old station while the latter was in active use.

As seen in the elevation, the traveler consists of five frames, each supported by a line of track. Of the five tracks one is at each end of the span, of course, and the other three are at convenient points between the old roofs, where they rest upon double rows of timber posts erected in the old trainshed for this purpose.

The cross section in fig. 7a is taken through the upper portion of the traveler and shows only that portion. As thus seen, each frame shows five posts, one in the centre and the other four so placed that each of them will come approximately under one of the four arches forming two adjacent pairs.

Under each of the five posts of the three upper frames of the traveler, and under the middle and end posts of the two end or lower frames, is placed a four-wheeled truck, resting upon one of the lines of track referred to.

The north wall shown at the right in fig. 7 is that of the old station. The iron work under the station floor will remain substantially as it was, a few additions only being made, and a similar construction will be placed under a portion of the added floor of the new trainshed.

The tracks under the ends of the span of the traveler are carried by the iron frame-work under the station floor. They are of the company's standard gauge, 4 ft. 9 in., and the three trucks resting upon each of them and carrying the end frames of the traveler are ordinary car trucks. The three remaining and inner tracks, on the other hand, are carried only by the double lines of 12x12 in. posts erected between the old sheds. They are therefore necessarily of narrow gauge (about 2 ft.) and special trucks are provided to run upon them.

At about the level of the top of the 85-ft. span of the old roof is placed the main working floor of the traveler. Its width is that of the traveler, 70 ft., and its length, 212 ft., extends from one side to the other of its arched roof. Over the 85-ft. span the width of this floor is increased on the west side by that (8 ft.) of a landing platform, carried by a timber truss resting upon brackets at the ends of its span, as shown in the section. The truss is shown also in the elevation, and in figs. 10 and 11.

Some of the timbers in the traveler reach the very respectable length of 80 ft.

The clear height under the traveler at the centre is such as to permit the 85-ft. span of the old roof to remain intact, with the exception of its lantern, while the northern, or 87-ft. span, must be removed in order that the traveler may advance. A portion of the western or outer end of the southern freight shed has been removed in advance of the construction of the new roof, in order to facilitate the rearrangement of some of the tracks entering the station.

When the four arches resting upon the traveler and forming two adjacent pairs have been riveted up, the blocks under them are removed and the traveler is moved forward or westward along the work through such a distance (about 65 ft., or nearly its own length) that its rear end comes under the forward pair of arches, while its forward end is ready to receive the next pair (see fig. 10). For this purpose the hoisting engines on and about the traveler are arranged to pull horizontally. The shifting of the traveler in this way occupies about three minutes.

At this writing (May 31) the traveler stands with its west side over the western ends of the old trainsheds at the east side of Sixteenth street and under arches Nos. 11 and 12, which are the last erected up to this time. Beyond this point the three double lines of timber posts, which have until now carried the three intermediate tracks upon which the trucks of the traveler run, would be deprived of the lateral support of the iron columns of the old shed. They will accordingly be dispensed with, and the three intermediate frames of the traveler will be spliced out and extended downward to the level of the train floor, where the tracks and trucks carrying them will be replaced. Where necessary, the curving tracks in the present yard will be shifted to accommodate this arrangement.

**General Views of the Work.**—Figs. 8 to 16, reproduced from photographs, represent the work as seen from different points of view, beginning at the southeast corner and passing around three sides, first westward, then northward and finally eastward. As already remarked, the points and directions of view are indicated by the arrows in fig. 1.

Fig. 8 is a view looking northwest along Market street from one of the upper stories of the new City Hall, nearly the same point as that from which the perspective view, shown in the *Railroad Gazette* of Oct. 21, is supposed to be taken. The City Hall is located at the intersection of Broad and Market streets, the two principal thoroughfares of the city, each of which nearly bisects it, running from north to south and from east to west respectively. In the immediate foreground is seen the extension of the head house in process of erection. The lower story of this building is of granite and the remaining stories of brick. The interior con-

struction, as shown in the photograph, is of wrought iron columns and girders. The company's principal office is now on Fourth street; after the completion of the extension of the new station, the offices now occupying the Fourth street building will be transferred to the new structure at Broad street.

At the extreme right is seen the south party wall of the present head house. After the completion of the extension this will be removed, so as to throw the two buildings into one.

Running west from the present head house and extending under the arch of the new roof are seen the roofs of the old passenger sheds. Just beyond Fifteenth street and at the northwest corner of Fifteenth and Market streets is the lower story of the new building (a portion of the extension of the head-house) which is to contain accommodations for the baggage and United States mail services. (See fig. 1.) Beyond this begins the new trainshed, of which eight arches had been erected when this view was taken. The figure shows the web plating in the nearest or easternmost arch (No. 1), and at the top of this arch the eastern end of the lantern, just beyond which is the small traveler used in the erection of the lantern.

Fig. 9 is a view of the same end arches (Nos. 1 and 2) as shown in fig. 8. It is taken from the southeast corner of Fifteenth and Market streets and shows a portion of the old east wall of the freight station, in process of demolition. Further to the right is seen the lobby of the present station extending over Fifteenth street.

Fig. 10, taken from a point still further westward, on the south side of Market street, between Fifteenth and Sixteenth streets, affords a good view of the traveler as it appeared on April 21, the day after having been moved westward for the erection of arches Nos. 7 and 8, the bottom sections of which are already in position, while arches Nos. 5 and 6 are seen resting upon the eastern end of the traveler. On the left are seen the remains of the old trainsheds, still doing duty, and over these is seen the projecting platform of the traveler, supported by its truss spanning the old 85-ft. passenger trainshed.

Fig. 11, taken from the same point of view as fig. 10, but five days later, shows arches Nos. 7 and 8 nearing completion. The northern top section of arch No. 8 is just being raised into position, and is still suspended from the derrick.

Fig. 12, looking nearly northward from the south side of Market street just west of Sixteenth street, shows the western ends of the old trainsheds, from which emerges the roadway, crossing Sixteenth street. On the right is the smokestack, still standing, of the old boiler-house at the northeast corner of Sixteenth and Market streets, and on the left the taller stack of the new boiler-house, at the northeast corner of Sixteenth and Filbert streets. The new stack, 133 ft. high (171 ft. from the street level), is like the old, of plate iron, lined with firebrick. It has 6 ft. 6 in. inner diameter, while the outer diameter tapers from 8 ft. 10 in. at base to 6 ft. 8 in. at top.

Fig. 13 is taken from the signal tower at Seventeenth street, looking east, and shows to good advantage the single span of the new structure covering those of the old. The new arches, however, suffer in this comparison, by reason of their greater distance from the eye. In the centre of the background rises the still unfinished tower of the new City Hall, portions of the roof of which are seen below, just to the right of the trainshed. The tower is of brick, faced with white marble, up to the level of the working platform shown, above which rises the prismatic portion of the ironwork which is to surmount it. Upon this prism will rest a pyramidal dome of ironwork, which is already erected in the yard of the builders, the Tacony Iron and Metal Company, at Tacony, Philadelphia. Both pyramid and prism are constructed with horizontal octagonal ribs bracing the vertical and inclined rafters, and without internal trusses. This part of the construction is the design of Mr. C. R. Grimm, M. Am. Soc. C. E. The dome will in turn be surmounted by a colossal bronze statue of William Penn. This figure, which now stands in the court yard of the City Hall, awaiting the completion of its lofty perch, is also the work of the Tacony company. It is 37 ft. high, and its top, when in position, will be 547 ft. 7½ in. above the street level.

Just over the northernmost of the old trainsheds in fig. 13, is seen the brick tower of the present headhouse, at the southwest corner of Broad and Filbert streets, and beyond this, on the left, at the northeast corner of the same streets, the tower of the Masonic Temple, one of the finest buildings in the Quaker City. Just beyond the view, on the right, rises the 14-story Betz Building, Philadelphia's latest great exponent of the modern system of "sky-scrapers," which stands upon the east side of Broad street just above Chestnut street, and is nearing completion.

Fig. 14, taken from the working platform of the traveler and looking eastward, shows the inner side of the first pair of trusses (Nos. 1 and 2), with the framework suspended from them for the support of the plate glass curtain closing the eastern end of the trainshed. Beyond is seen the rear or western side of the present head house. This figure shows also the 7-ft. purlins at joints No. 3, under the walls of the lantern, and some of the 4-ft. purlins in the rest of the roof.

Fig. 15, taken from the north side of Filbert street, west of Fifteenth street, shows the bottom sections of

the northern halves of arches Nos. 1 and 2, at the eastern end of the work, with the remains of the old trainshed still standing.

Fig. 16, taken from the new boiler-house at the northeast corner of Sixteenth and Filbert streets, shows the manner in which portions of the old north wall of the station are being utilized as supports for the new trusses. As seen under the arch at the extreme left, the old walls are being reinforced at those points where the trusses are to rest. At the right are shown the two stones for trusses Nos. 9 and 10, placed in position in the reinforced wall. The old brick arches in this wall (of which two are shown) are being replaced by flatter ones, and the upper portion of the wall is being removed down to a point a little above the foundation stones of the iron arches. From this level to the foot of the upper chord of the iron arch will extend the metal sheathing already referred to.

**Details.**—Fig. 17 shows the southern or Market street end of one of the normal trusses, No. 3, with the eyebars forming the horizontal chord in position. The southern ends of the trusses rest upon fixed shoes and the northern ends upon movable shoes on rollers. Both of these forms of shoe are shown in fig. 18. It will be seen that in the normal movable shoes each nest contains 11 steel rollers 3 in. in diameter and 2 ft. 3 in. long. The diagrams of the fixed shoes show the arrangement, already described (fig. 3), by which the transverse floor girder between the feet of the two arches forming a pair is utilized so as greatly to increase the resisting moment against wind forces. This arrangement, of course, does not obtain at the north ends of the arches, where the shoes are movable.

Fig. 19 shows a number of the triangular foot-members of the arches lying in an inverted position, and fig. 19 shows a side elevation, a vertical section and a plan of one of these members. They are first erected, with the eyebars of the horizontal chord connected by means of their 5½ in. pins; and while the foot member is blocked up in approximate position, the bottom section of the arch, extending from the top of the foot to joint No. 27 (see fig. 3) is lowered upon it.

The foot members of the two arches forming a pair and standing nine feet apart, centre to centre, are afterward connected on the outside by a member called a "bottom strut," shown in figs. 15 and 23, which is riveted to each of them. The end of one of these bottom struts is shown in fig. 17, extending to the left from the back of the foot member. The projection, as shown, serves as a connection for the longitudinal framing between the several pairs of arches.

Fig. 21 is a view of a pair of top sections. Like the foot members in fig. 20, they are here seen lying in an inverted position. Fig. 22 is a side elevation of one of the triangular half-panels at the apex, forming the extremity of such a section, and shows the pin connection between the two half-arches at the apex of the roof. It shows also portions of the two horizontal idle members introduced merely in order to continue the lines of the chords of the arch to the centre of the span. As indicated in the figure, these members are provided with sliding joints. Here, as in the bottom connections, the pin is 5½ in. in diameter, and the thickness of the metal bearing between each arch and the pin is 2½ in., exclusive of the ½ in. lap plate.

Fig. 23 is a view looking north across Market street midway between Fifteenth and Sixteenth streets, and embracing two pairs of arches, Nos. 5 and 6 on the right, and Nos. 7 and 8 on the left. This view shows the two systems of longitudinal framing between the two pairs of arches at the top and the bottom of the bottom section respectively, and supported by the bottom sections of the two "purlin struts" shown, as also the "bottom strut" connecting the feet of arches Nos. 7 and 8, while that joining Nos. 5 and 6 is hidden by the top of the completed base wall at that point.

**Improvements Incidental to the Work.**—Figs. 24, 25 and 26 show some of the completed structures already erected in connection with this work. Fig. 21, taken from the south side of Market street below Sixteenth street, and looking northwest along that street, shows the new building of the Adams Express Company on the northeast corner of Seventeenth and Market streets, which takes the place of that formerly occupied by the same company on the northwest corner of Sixteenth and Market streets. The sites of both of these buildings are shown in fig. 1. The shed, extending eastward from the new building, joins the western end of the new trainshed.

Beyond the Adams Express building and Seventeenth street are seen the new freight offices and freight station of the railroad company.

This figure shows the two horizontal girders reinforcing the wind-stability of arches 17-18 and 19-20, with the two iron posts under the nearer one (see fig. 3). The insertion of the diagonal braces in the panel between the posts is deferred, in order to avoid encumbering the working space.

Fig. 25 is taken from the south side of Market street just west of Eighteenth street, looking nearly east, and shows, in the foreground, the fine brick four warehouse of the railroad company, beyond which are the new freight station and freight office, the new Adams Express building, the trainshed, and, in the extreme distance, the new City Hall at Broad street.

The erection of the buildings here shown has wrought an entire transformation in the appearance of this portion of Market street. Formerly the site of the nearest

<sup>6</sup> In constructing the traveler some minor deviations were made from the original design. The figure is made to correspond with most of these.

corner of the flour warehouse was occupied by the old freight and passenger station of the West Chester & Philadelphia Railroad, now a part of the Pennsylvania system. This was a small one-story building, fronting upon Market street and covered by a low arched roof, from which the writer, during his boyhood in the early sixties, has often sallied forth in cars drawn by mules upon the surface of Market street to West Philadelphia, where the iron horse took up the work and proceeded toward West Chester. The remainder of the frontage, eastward from this, was occupied by small buildings of heterogeneous and unprepossessing, not to say shabby, appearance.

Fig. 26, looking north along Seventeenth street from Market street, shows on the right the new Adams Express Building, on the left the new freight office, and between them the stone-faced brick arch by which the railroad and the Adams Express track cross Seventeenth street. Over the arch is seen the Seventeenth street signal tower, from which the view in fig. 13 was taken.

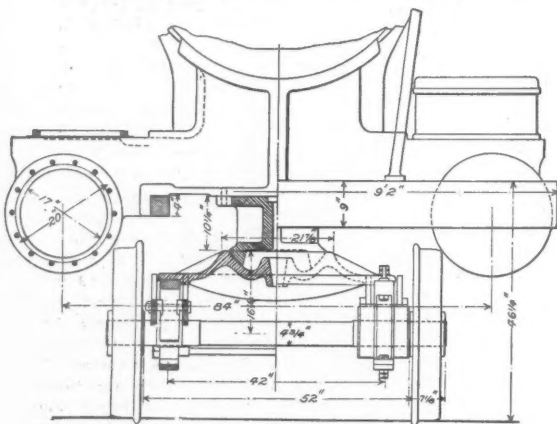
Arches similar to this, except that they are not faced with stone, carry the nine tracks of the roadway across Sixteenth, Eighteenth, Nineteenth, Twentieth and Twenty-first streets; that over Twenty-first street forming part of the new work incidental to the enlargement of the station. These arches, 2 ft. 6 in. deep (showing 2 ft.), are of 50 ft. 1 in. span and 7 ft. rise, while the smaller arches, which carry the viaduct of the extension from one to the other of these streets, are of 26 ft. span and 7 ft. rise, and are 2 ft. deep.

*Moral.*—Comparatively young men can recall the condition of the terminal facilities of Philadelphia so recently as 20 years ago, when the Pennsylvania Railroad's passenger terminal equipment consisted of two timber sheds in West Philadelphia and one at Kensington (provided with one-story brick ticket offices of the plainest description), and a frame ferry-house at Walnut-street wharf; when the Reading Railroad boasted only of its large but extremely dingy station at Broad and Callowhill streets, and when the Philadelphia, Wilmington & Baltimore station at Broad and Prime streets (now abandoned to freight uses) was perhaps the finest in the city. To these young men, and to those older ones, many of whom are still living, who remember when the wisacres pooh-pooed the idea of making the railroad anything but a scientific toy, the enormous and super-palatial structures of the Pennsylvania and the Reading railroads, both now nearing completion, must appear as striking illustrations of the growth of our country in general, and of its railroad system in particular, and this impression is heightened when we consider how vastly greater is the progress in each decade than that in the preceding one or two. Not only are we growing, and growing fast; our rate of growth is rapidly increasing.

The question irresistibly forces itself upon us, What of the future? What will be the manner of the awakening, 20 years hence, of the Rip Van Winkle who falls asleep to-day?

#### The "Exposition Flyer" Locomotive of the Lake Shore.

Last week we showed a perspective view of the Class 17-A, fast passenger locomotive, built by the Brooks Locomotive Works, of Dunkirk, N. Y., for the Lake Shore Railroad, to haul the New York-Chicago 20-hour

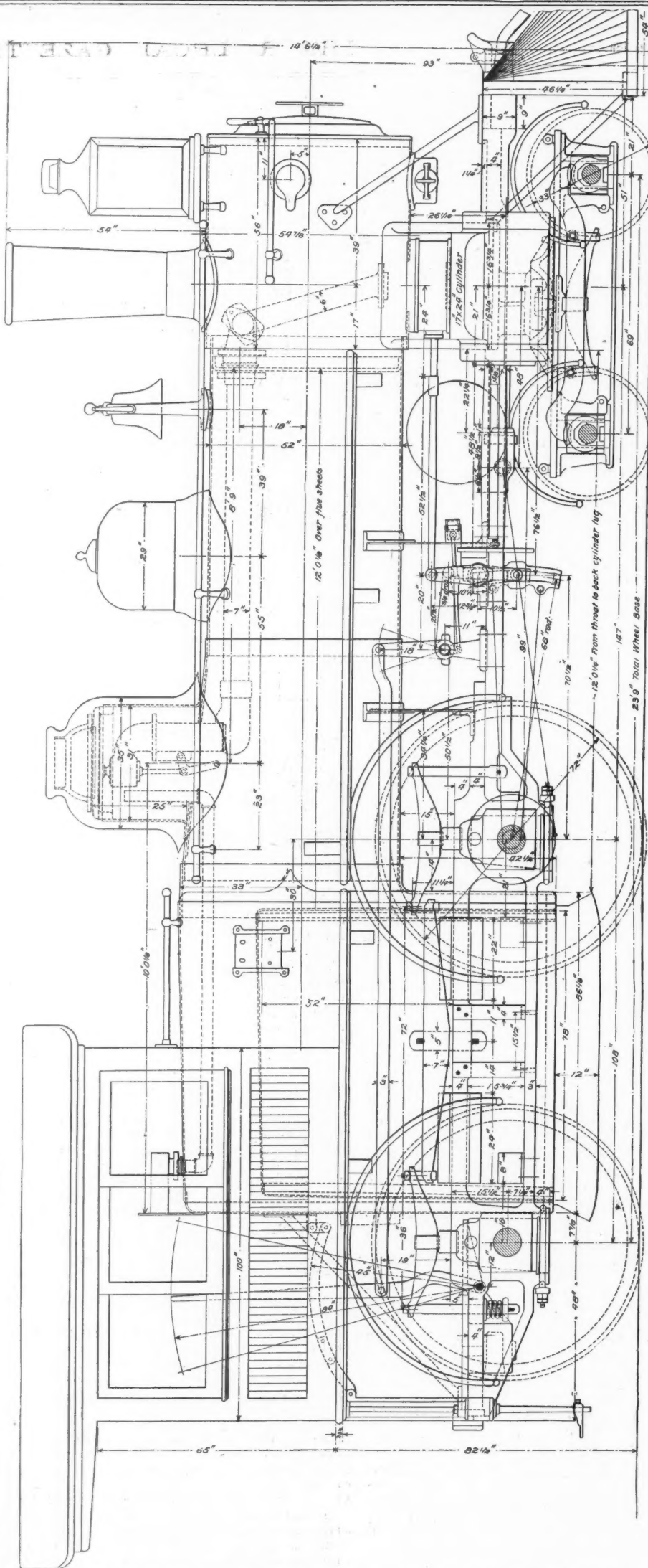


train, known as the "Exposition Flyer." A description with specifications of dimensions and material was given in that issue. We show herewith line drawings, giving dimensions of all the principal parts, and several details.

#### The Cape Cod Canal.

During the past winter and spring the Legislature of Massachusetts has been considering the claims of four separate interests asking a charter empowering them to build a canal across Cape Cod; a canal which would, if of sufficient capacity and convenience, save many lives and much property now annually lost passing around the Cape, and would enable passengers leaving New York at night to reach Boston in time for business the next day without the present change from boat to cars. Within a few days two of these interests, the Old Colony & Interior Company—New York parties—and

the Cape Cod Canal Company—Boston parties—have combined, intending to build by the Bass River route, and the Senate has passed the House bill with some amendments. It is claimed that this legislation insures the construction of the canal and that work on it will be commenced in 60 days.



"EXPOSITION FLYER" LOCOMOTIVE, CLASS 17-A—LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.  
Built by the Brooks Locomotive Works, Dunkirk, N. Y.  
Mr. G. W. STEVENS, Superintendent of Motive Power.



## Notes on the "Southwestern Limited."

CLEVELAND, March 31.

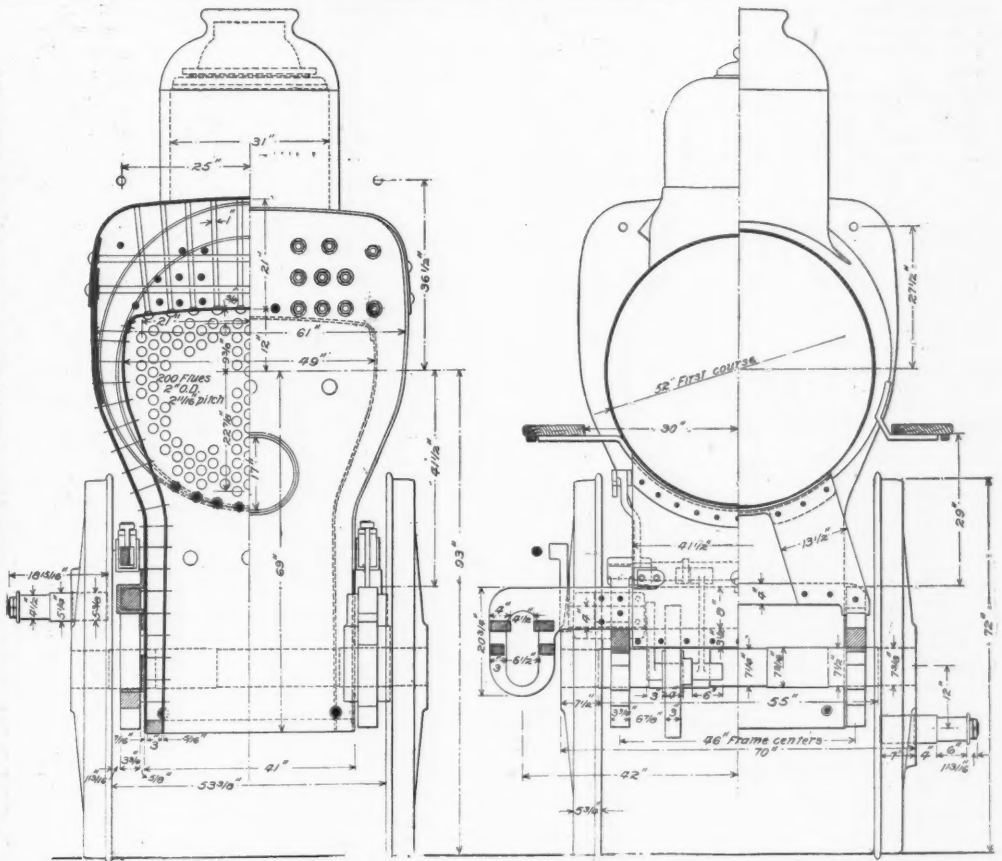
The Southwestern limited express of the New York Central and Big Four roads gives one a good impression at the very outset, and that is half the battle. A comparatively new sleeping car, just from the cleaning yard, is always a pleasant place to step into, because for about 95 per cent. of the time that one spends in a sleeper he has to put up with more or less dust and discomfort, and the cleanness therefore has the supporting effect of a contrast; but what I refer to now is not this necessarily temporary pleasure, but another one, of even smaller consequence perhaps, a convenient time-table. The announcements of the dining car, which are distributed immediately after leaving New York, contain a time-table of this train, and this only; and it shows the time at prominent stations at which the train does not stop, as well as at the places where it does. This is so much better than a sheet a yard square, which one has to fold wrong side out and then study with considerable care in order to keep track of where he is, that it must be appreciated by a good many passengers. Even those who have been over the road a good many times make use of this kind of an aid in keeping their mental log. This little leaflet is not got up elaborately and one is not subject to worry lest he lose it and thereby deprive the children of a work of art which he might have carried home to them; and it must be a profitable investment.

On the other hand, the bills of fare in the dining car have a little too much elegance; that is, they are so beautifully embossed and colored that the conductor apparently does not feel at liberty to throw them away as soon as they have become soiled. A costly card that is not clean is much less pleasing than a plain one which is. On the Lake Shore dining cars the bill of fare is printed on the back of the numbered check that the conductor issues to each guest, and it is, therefore, always new and clean, of course. It is also large enough and convenient, the check consisting of three large coupons, one for the waiter, one for the cook and one for the cashier (conductor). Numbering these documents and issuing one for each guest necessitates printing them some time beforehand, and the frequent changes in kinds of food must waste a good many cards, but this waste is not great, for the changes are not excruciatingly frequent. This remark is not intended as an intimation that the variety of dishes is meagre or commonplace, but as a tribute to the skill with which dining car stewards will get up a dinner that is fresher than the bill of fare.

While I am on the subject of dinners, I will mention a matter not connected with this train, but one which all passengers are interested in, and that is the ventilation of dining-rooms. The word "dinner" brings it to mind now, because I ate in the restaurant at the Grand Central Station, New York, just before boarding the Southwestern Limited. The odors in that room that were not welcome were rather more numerous than those that were. The waiting-room on the floor above the restaurant is worse than the restaurant, for, besides the volatilized onions and other things that float up from the basement, it has the vitiating effect of hundreds of human lungs, and such a thing as ventilation is apparently never even thought of. This waiting-room has recently been repainted in very handsome tints, but it would have been better to leave the walls black for a dozen years, if that were necessary to enable the company to put in a ventilating fan. Fans and the power to run them are so cheap nowadays that there is no excuse for smothering people in large railroad stations.

The *Railroad Gazette* has heretofore published the fact that the block and interlocking signals erected on the Hudson River division of the New York Central by the Johnson Company constitute one of the completest plants in the country, every switch being properly signaled and the block instruments being all provided with the latest electric safeguards; but besides this, the passenger riding along the road notices one other merit that is worthy of mention and that is, the good taste shown in the designs. It can hardly be said that the color of the towers is as pleasing as that of the towers on the Pennsylvania, the principal color, yellow, being of just the right shade to look crude; but in other respects the impression of utility, quietness and permanency is very favorable. The modest height of the semaphores—25 ft. or less—is particularly worthy of note. With judicious location this height is, in most cases, just as serviceable as 35 ft. or more, and the absence of that unnatural feeling that the signals are more important than the track, bridges and locomotives, all combined, is a positive relief. The distant signal arms are painted yellow with a >-shaped black stripe across the face. Why not follow the Pennsylvania Company the whole figure, and paint all arms yellow? We should then get rid of the anomaly of a red signal indicating "all right."

When the ground is covered with snow and the air is black with rain, Brother Daniels' much-vaunted Hudson River scenery does not amount to much, and a passenger is inclined to look at the signals longer than he would if he could see a four-track railroad, the Hudson River, a sunny sky, a frowning mountain and the Mohawk Valley all at once, as he can in the pictures; but to see the signals you have to look out at the rear end of the rear car, and you soon become aware that a vestibule car is very inconvenient for this purpose. As



Lake Shore Locomotive, Class 17A.

the addition of the vestibule makes an ordinary end window out of the question the car builders put in no end window at all, and so when four or five men wish to look out at the same time they have to take very awkward positions around the narrow window in the door. As the Pennsylvania road continues to run its observation car after several years' experience with it, it is safe to conclude that people who like to see the road are still numerous enough to be taken into account, and it would therefore seem to be the proper thing to put as many windows as possible in the end of every car. A circular window 10 in. in diameter would be greatly appreciated by most people who sit in the end seat of the hind car, and one of that size could easily be put in without disturbing the vestibule.

The Albany station has not lost any of its awkwardness in the last dozen years. Westbound trains stop under a shed which is seemingly about 50 rods from the station building proper, and this distance is often made practically 50 miles, instead of rods, by the presence of one or more eastbound trains, which makes one reluctant to cross over to mail a letter or make an inquiry, lest he find difficulty in getting back promptly. The most notable sight at Albany, however, is the extreme modesty of the Boston & Albany road. Its solid black engines have no inscription but the number, and the observer has to look around some time before he gets any idea what road's train he is looking at. At first sight one is inclined to wonder whether the road has been forced to press into the passenger service some old gravel-train engine whose lettering has been blackened by age, but a closer inspection shows that the machines are remarkably clean; and the initials of the road are probably discoverable on some of the castings (along with the pattern number) if one follow up the search.

In abandoning the gaudy decorations of former years American locomotive builders have in many cases gone too far. Some of our best lessons in plainness came from the English, but it cannot be said that they taught us to abandon all decoration, for some of the best recent English locomotives are tastefully striped. The Pennsylvania, the New York, New Haven & Hartford and the New York Central still continue styles which conform to a happy medium in this respect.

The foregoing refers to engines in service, of course. The aesthetic passenger has, perhaps, no right to criticize the appearance of engines laid off for repairs; but when a dozen or two of the rustiest old tubs imaginable, with crushed tenders and broken stacks, are seen from the car window, in a 10-acre lot where there is nothing else to divert the eye, he probably ought to be pardoned if he suggests that a 10-ft. board fence, to protect those engines from the rude gaze of the unfeeling public, would be desirable. This paragraph is intended to be entirely general in its application, of course!

The heavy and the fast westbound trains of the New York Central have the aid of a pushing engine for about three miles out of Albany, the grade being very steep. These trains consist of new and strong cars, the engines are in the best repair and the track is first class, but in view of the very general condemnation of this practice one may feel a trifle nervous if he is inclined that way, nevertheless. For an engine to push with all its might for even a few seconds after danger has been discovered

by the forward engineer (and before he has conveyed the information to the runner's ear, and through that to the throttle, on the pushing engine may some time greatly aggravate a disaster. Some states, I believe, have laws forbidding the pushing of passenger trains. At the same time it seems too bad for a train which is in a desperate hurry to stop just for the purpose of detaching an engine. The least that the Central can do is to connect the air brake and the air signal through to the cab of the pusher and keep them connected until just before the drawbars are separated. Besides this it is to be hoped that all the wheels of the pusher and its tender have the most efficient brake power, so that if the train should be suddenly stopped just after detaching the pusher, the latter could be stopped before running into the hind car.

## A New Type of Cargo Steamer.

*Engineering* of May 28 gives a good description, with illustrations, of a new cargo steamer, designed, patented and built by Messrs. William Doxford & Sons, Limited, of Pallion Yard, Sunderland, England.

This steamer has some points of construction worth noticing.

The most valuable feature claimed for it, from a commercial point of view, is its real carrying capacity compared with its registered tonnage, the capacity being about 13 per cent., net, more than the partial awning-deck steamer of the usual type. This fact means a handsome profit to the new design, while an ordinary well-decker would be carrying at a loss. The comparison with spar-deck vessels is even better, the inventors figuring the tonnage of the new type as 13.3 per cent. and the cubical measurement as 7.5 per cent. greater, and claiming that these advantages gained are not offset by any special disadvantages.

This gain is accomplished by adopting a new cross section and shape which admits of more economy of space in the framing and staving, and this gives greater capacity for loading. The cross section is bulbous in shape. The sides of the vessel and the weather decks are not broken by gunwales, but the contour is one continuous curved line of plates or wales. This lapping or bending over of the sides into a weather deck contracts the working deck to about one-third the width of the vessel. This working deck is built up about 5 ft. above the weather deck, and the sides join it in an easy curve not unlike that made by the stem of a bulbous plant, with the bulb itself. Or the section might be compared to that of a low, wide, short-necked ink bottle, with rounded corners; the top of the cork being the working deck, the shoulders of the bottle the weather deck, and the top, bottom and sides being straight.

The space between the working deck and the sides makes a reservoir, which is filled with water in a heavy sea, the weight of which tends to right the boat, that of the other side having run off. In the common type of vessel this water flows across the deck from the higher side to the submerged side and tends the more to heel the vessel; while in this new type the long narrow raised deck prevents the water from flowing across.

Another advantage gained by this contracting of the sides into a neck is that it prevents the movement of a

RELATIVE FREQUENCY OF BREAKAGES IN DIFFERENT PARTS OF WROUGHT IRON JANNEY FREIGHT COUPLER KNUCKLES, DETERMINED BY PERCENTAGE COMPUTATIONS FROM THE TOTAL NUMBER OF BREAKAGES REPORTED BY EACH RAILROAD FROM JAN. 1, 1886, TO MARCH 31, 1893.

Nature of defect.	Period.	General average.	A. V.		B. & O.		C. & Q.		C <sub>1</sub> , C <sub>2</sub> & St. L.		Canda C. C. Co.		C. M. & St. P.		C. & N. W.		C. R. I. & P.		C. & O		G. R. & I.		L. S. & M. S.		I. V. M. C.		N. C.		N. Y. C. & H.		N. Y., C. & St. L.		N. Y., L. E. & N. W.		N. P.		Pennsylvania.		P. Cb., N. W.		P., W. & B.		R. & D.		R., W. & O.		U. P. W. S.		W. N. Y. & P.		W. C.		Miscellaneous.		Nature of defect.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Upper lug off.....	1	27.59	18.15	16.53	27.85	21.09	14.59	36.78	30.78	27.40	19.63	42.65	17.30	24.28	22.01	42.56	11.49	19.21	29.13	33.02	38.56	32.91	38.25	21.48	17.10	38.67	19.98	18.92	37.23	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28

Period No. 1 is from Jan. 1, 1886, to March 31, 1892.

Period No. 2 is from April 1, 1892, to March 31, 1893.

Period No. 3 is from Jan. 1, 1886, to March 31, 1893.

For comment see the editorial pages.

loose cargo when the ship rolls, in much the same manner that the dome of a tank car saves the surging movements of the tank contents.

The machinery has been placed aft and the steamer provided with water compartments and tanks, which are filled to keep the vessel in trim as her coal is exhausted.

Special attention has been given to the details of framing, bracing and splicing, angles and channels being used which are fitted and riveted in the strongest and most unique manner. Add to these improvements a high reserve buoyancy, an improved quadrant and worm device for steering and a new hydraulic ejector for removing the ashes from the boiler-rooms, and it would seem that the designers and patentees had given to the freight service a well equipped and profit earning vessel.

#### Rhode Island Compound Locomotive for the Chicago, Milwaukee & St. Paul.

One of the engines now attracting a great deal of attention from engineers at the World's Fair is the Rhode Island compound ten-wheeler, built for the Chicago, Milwaukee & St. Paul Railway. This is a magnificent looking engine and was designed to haul heavy passenger trains over light rails at high speeds with the minimum damage to the track. The engine, as shown by

the engraving, differs from other express engines having six drivers in several important respects, among which are the large diameter of drivers and trailing two-wheel truck. The function of the trailing truck is not so much to guide the engine as to carry weight, for an engine of this class will do but little backward running. The drivers are large, even for engines of the American or eight-wheel type, though it is by no means certain that the limit of diameter of drivers for ten-wheel engines has yet been reached.

It is interesting to note the increase in number and diameter of drivers as the weight and schedule speed increases. The tendency with British designers has always been toward large single driver engines for high speeds, but recently the increased weight of trains has led to the building of engines with somewhat smaller drivers and two coupled axles.

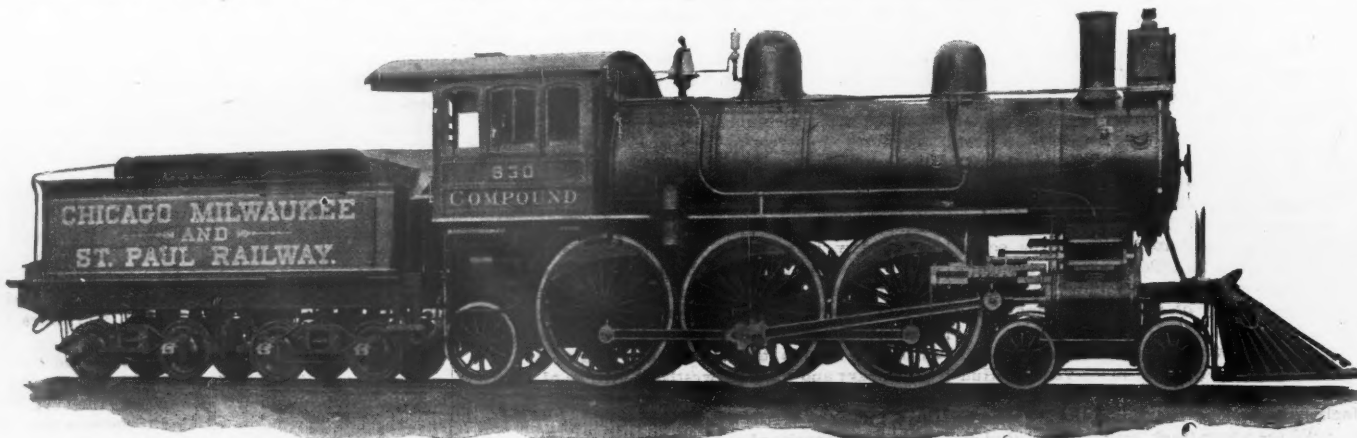
Engines with single drivers have not for many years been in general use in America, but as the speed of trains increased the diameter of driving wheels increased, until now the drivers of American fast four-coupled engines are as large as those of English four-coupled engines for similar service. The Rhode Island engine shows this tendency in the West, and any one familiar with the weight of trains hauled regularly out of Chicago will grant that there are many good points in the design. The distribution of the adhesion weight of

88,500 lbs. on six drivers will be looked upon with favor by civil engineers, and no one has ever shown that the internal friction of an engine is perceptibly increased by the addition of a driving axle and pair of connecting rods. As to the size of drivers, the fact cannot be disputed that with a large diameter and a consequently decreased number of revolutions the steam distribution can be greatly improved.

The design of the intercepting valve is practically the same as illustrated in the *Railroad Gazette* of Dec. 11, 1891, and to which numerous references have been made since that time. This intercepting valve, as our readers will remember, is operated automatically when the throttle is opened; the engine starting with steam in both cylinders and changing to compound when the desired pressure in the receiver has been reached by repeated exhausts from the high pressure cylinders. It is also possible to change the engine from compound to simple at the will of the engineer, by opening a valve between the receiver and the exhaust pipe, thus allowing the exhaust from the high pressure cylinder to pass directly from the receiver to the exhaust nozzles.

The principal dimensions of the engine are as follows:

Diameter of H. P. cylinder.....	21 in.
Diameter of L. P. cylinder.....	31 in.
Stroke of pistons.....	26 in.
Diameter of drivers.....	78 in.
Gauge.....	4 ft. 8½ in.



Compound Express Locomotive—Chicago, Milwaukee & St. Paul.

Built by the RHODE ISLAND LOCOMOTIVE WORKS, Providence, R. I.





from which it gets its power, except that the potential has been reduced to 360 volts by transformers as it would have been at the end of a long line of transmission.

From the constant current terminals of the rotary transformer power is taken for driving a number of street railway trucks and motors. In addition to this, the shaft of the transformer is lengthened at both ends and pulleys drive from the one side a 35-light arc machine and from the other side a 75-H. P. Worthington pump. To show the endless ways of transforming, this Worthington pump furnishes water to a Pelton wheel which is coupled to and helps to drive the rotary transformer No. 1.

There are a number of other smaller systems of transforming, similar to this, shown in the exhibit, which need not be described here at length. It is probable that the use of condensers in connection with motors of the alternating type as recently employed by Mr. Stanley, will also find a place among the exhibits of the General Electric Company.

From the foregoing it can be understood what remarkable progress has recently been made toward perfecting alternating motors. With the use of the poly-phase types the difficulties encountered formerly in attempting to synchronize a generator and follower are entirely overcome, while reactive coils offer a compact and unwasteful means of speed regulation.

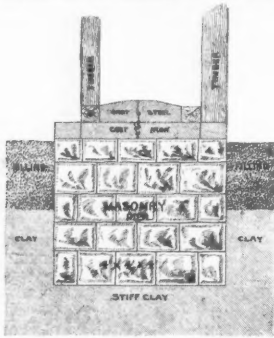
LUCIUS E. MARPLE.

CHICAGO, May 29, 1893.

#### The Coupler Tests of the Western Railway Club.

We have received proofs of the report on tests of M. C. B. couplers made by the committee of the Western Railway Club, and the tables and principal part of the discussion by the committee follow:

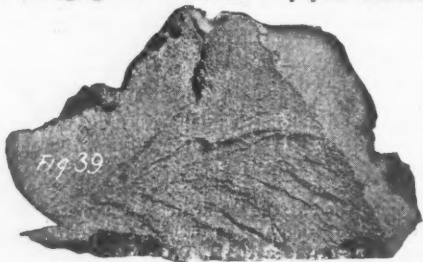
That good results are already coming from the coupler tests proposed last year is evident from the fact that many of the manufacturers are now equipped not only with apparatus for making the drop tests, but with appliances and machinery for tensile tests, and some of the most advanced are taking up the chemical ques-



Foundation of Drop—Western Railway Club Tests.

tions involved. With these appliances they are enabled to gather information at their own works in a comparatively short time which heretofore could only be obtained by tedious and slow service tests on a railroad. We do not wish to be understood as ignoring the importance and usefulness of service tests. We consider them essential in all cases. It is, however, possible, through a shop test, to cull out some of the more glaring defects of a device much more quickly than from a service test, and herein, it is believed, rests its great advantage. It is gratifying to know that in several instances the importance of the M. C. B. shop tests is so fully recognized by manufacturers, that not only couplers but air brakes are being tested and materially raised in efficiency without any service tests whatever, and regardless of the fact that in several instances they are already vastly superior to many of the appliances that in the past have been purchased and placed in quantities under the car equipment of railroad companies.

In arranging for the tests made by your committee



Specimen of Steel—Western Railway Club Tests.

invitations were sent to all the coupler companies whose addresses could be obtained, and in nearly every case not only was a ready acquiescence given to participate in the investigation, but assurances of hearty approval and co-operation in the committee's efforts were made on the part of the manufacturers.

The scope of the tests as outlined was as follows:

**PULLING TESTS.**—April 17 and 18. 7:30 a. m. World's Fair Machinery Hall. Riehle Bros.' 200,000-lb. testing machine. Under supervision of Robert W. Hunt & Co.

**DROP TESTS.**—April 19. 7:30 a. m. The Sargent Co.'s works, Fifty-ninth and Wallace streets, Chicago. Under supervision of Robert W. Hunt & Co.

1. Paragraphs 2, 3 and 4 of M. C. B. specification tests as described on page 134 of the M. C. B. Annual Report of 1892.

**NOTE.**—Bars will not be tested to destruction in these tests except in the drop test.

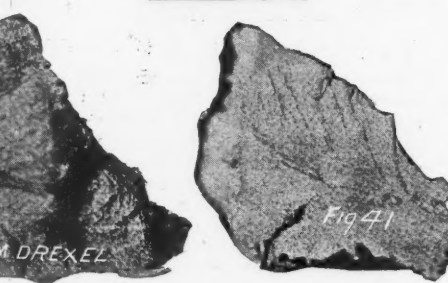
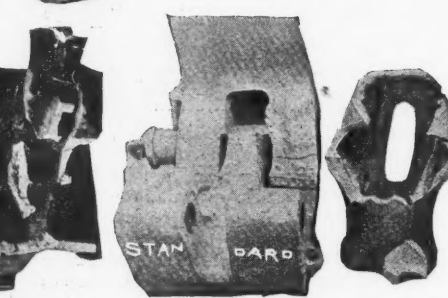
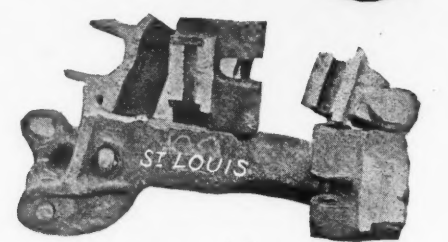
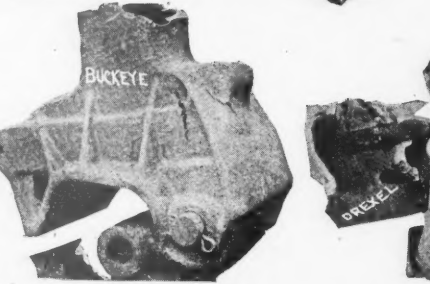
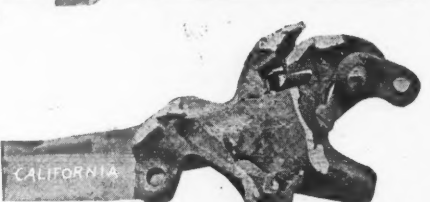
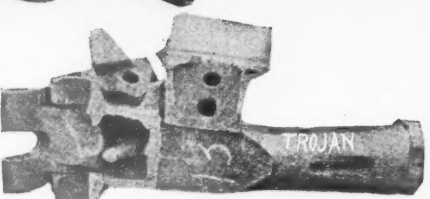
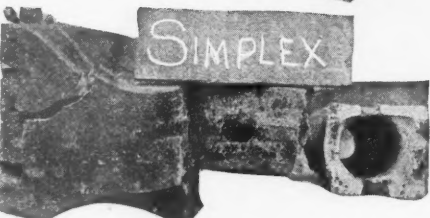
2. Single Lug test. The upper lug of one bar will be coupled to the lower lug of the other, and pulled to destruction.

3. New knuckles will then be inserted and the bars pulled to destruction under the pulling test of Test No. 1.

**NOTE.**—All bars will be subjected to Tests 1 and 2. Test No. 3 will depend upon the time occupied in Tests 1 and 2.

4. The drop tests will be arranged so as to practically cover the guard arm tests recommended.

5. Paragraphs 2 and 3 of the recommended additional tests will be omitted.



#### WHAT THE WESTERN RAILWAY CLUB DID TO SOME COUPLERS.

1. Each company entering the tests will be required to give the following information:

(a.) The kind of material in the drawbar.

(b.) The kind of material in knuckle.

(c.) The kind of material in lock.

(d.) The kind of material in knuckle pin.

2. Drawbar castings.

(a.) State whether the bars were specially made for test purposes.

**NOTE.**—The committee does not object to having bars made especially for testing.

(b.) State if the bars are supposed to represent the average product of what is manufactured.

(c.) If the bars are second-hand and have been taken from service, state how long they have been in service.

(d.) If parts of the bars are made of steel state whether made by the Bessemer or open-hearth process, and give the percentage of carbon in the steel.

1. Two bars or more for pulling tests should be shipped to Riehle Bros. Testing Machine Exhibit, Machinery Hall World's Fair, Chicago, Ill.

2. Two bars or more for drop tests should be shipped to the Sargent Co., 59th and Wallace streets, Chicago, Ill.

3. A few extra knuckles should accompany the bars.

4. All freight should be prepaid with an additional six cents.



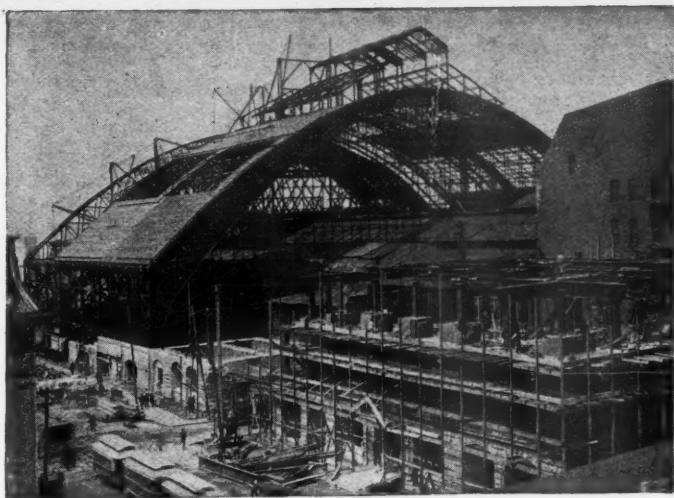


Fig. 8—Northwest from Fourth Story of City Hall. April 26.

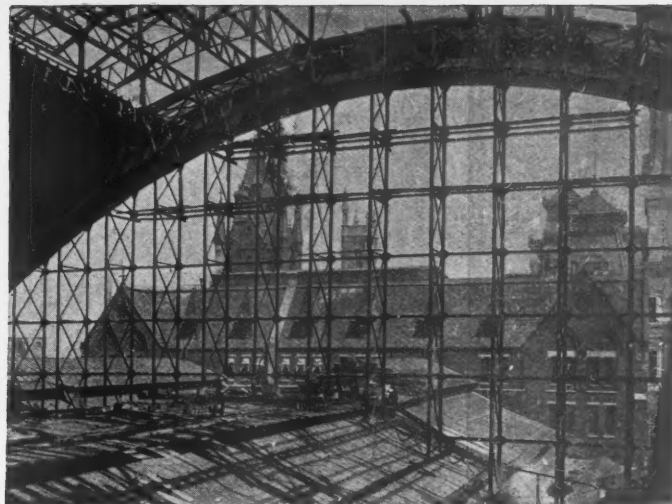


Fig. 14—Arches Nos. 1 and 2, with Framework for Curtain. From Platform of Traveler. April 26.

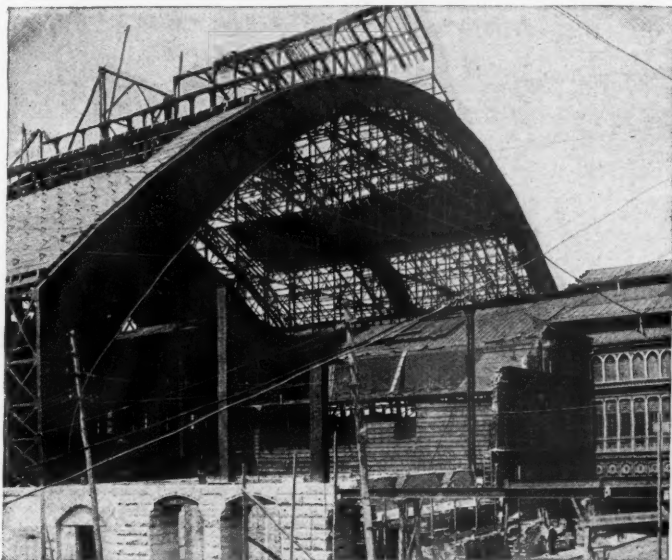


Fig. 9—Arches Nos. 1 and 2 from Southeast Corner Fifteenth and Market Streets. April 26.

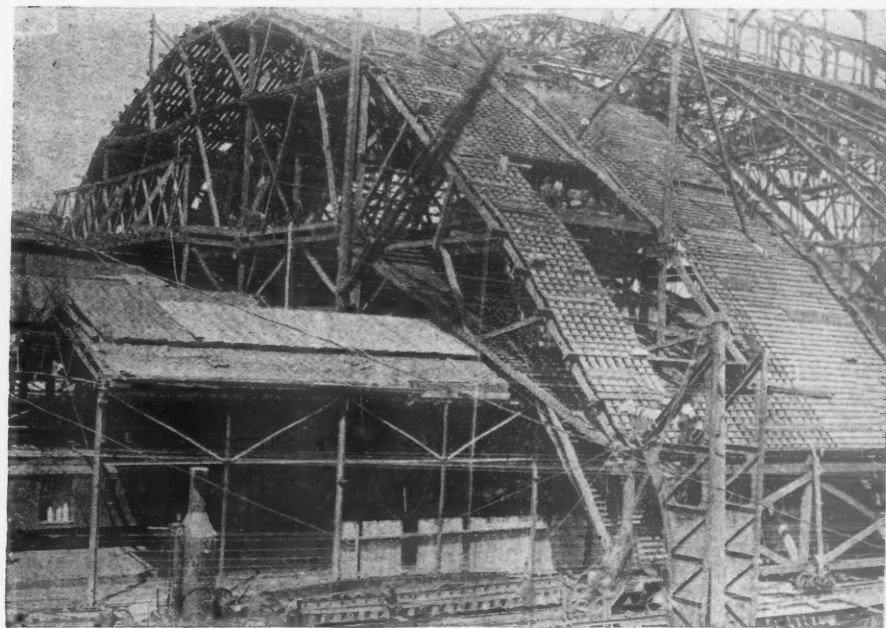


Fig. 10—Traveler, Looking North. April 21.

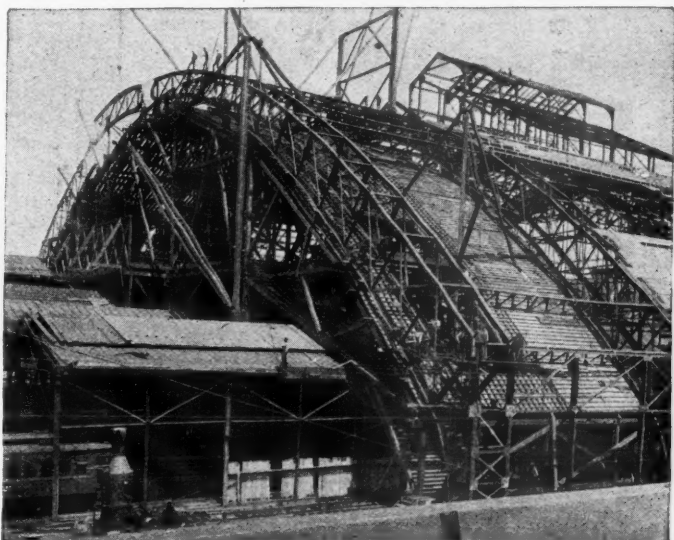


Fig. 11—Traveler, with Arches 5 and 6, 7 and 8, Looking North. April 26.



Fig. 16—Old North Wall. Filbert Street Below Sixteenth. April 18.

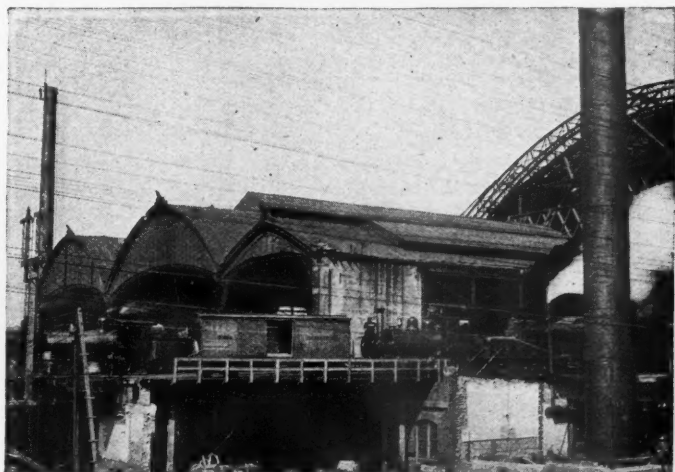


Fig. 12—North from Sixteenth and Market Streets. April 18.

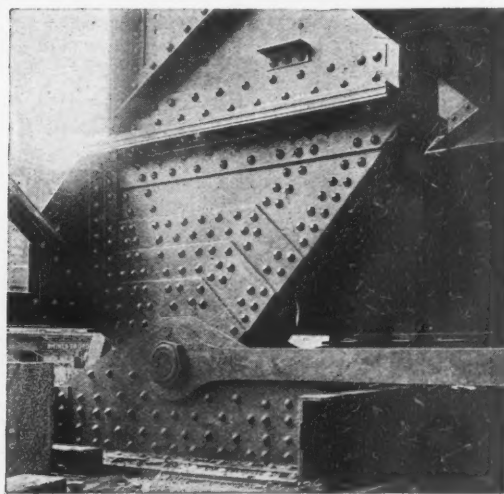


Fig. 17—Foot Connection.

THE NEW BROAD STREET STATION OF THE  
The points from which the photographic views were

Designed by MR. WM. H. BROWN, Chief Engineer, and MR. WM. A. PRATT, Engineer of Bridges.



tain. From Platform of

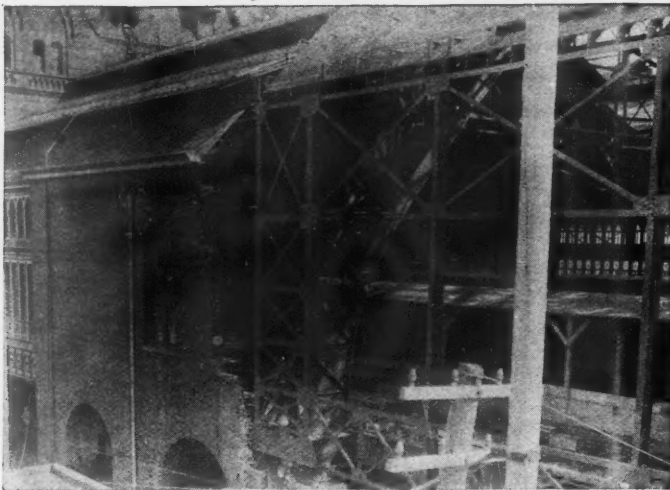
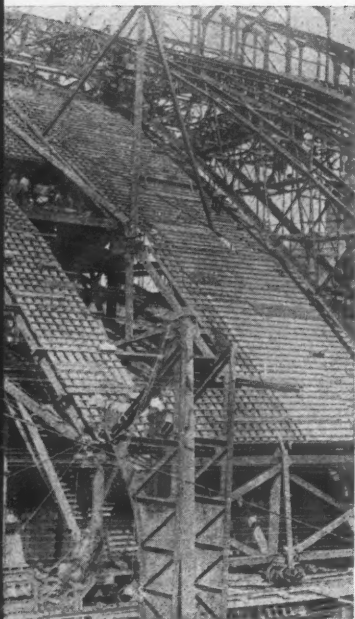


Fig. 15—Bottom Sections of Arches 1 and 2, Looking Southeast. April 21



April 21.

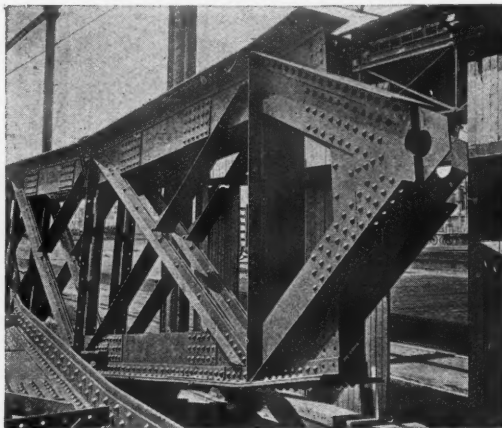


Fig. 21—Top Sections (Inverted).



Fig. 24—Market Street, Looking West from Sixteenth. April 26.



th. April 18.

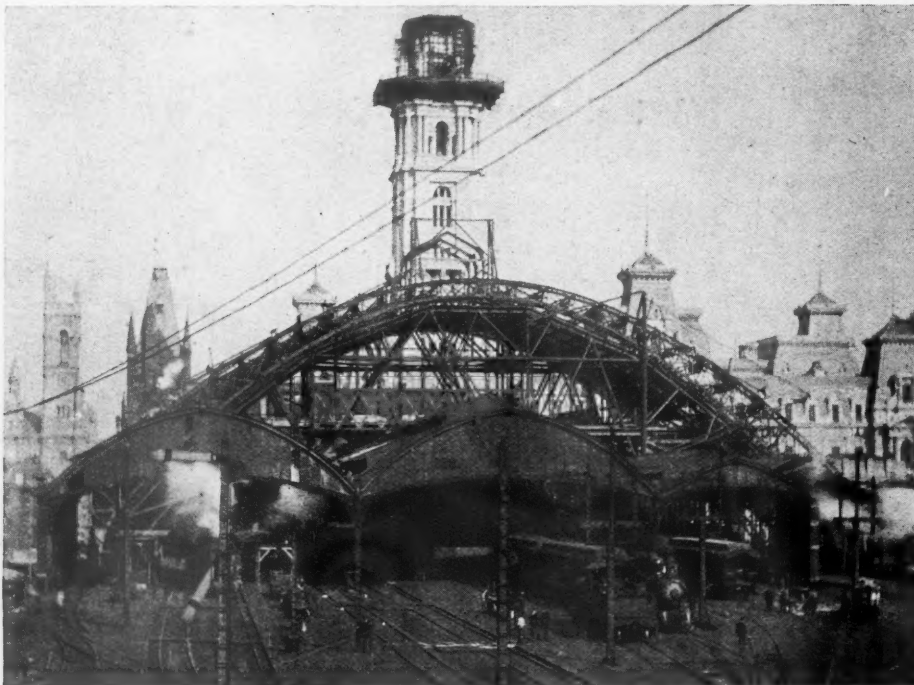


Fig. 13—East from Signal Tower at Seventeenth Street. April 18.

BROAD STREET STATION OF THE PENNSYLVANIA RAILROAD AT PHILADELPHIA.

into from which the photographic views were taken are shown on the plan of tracks, fig. 1.



Fig. 25—Market



Fig. 23—Bottom Sec



Fig. 26—Sevent



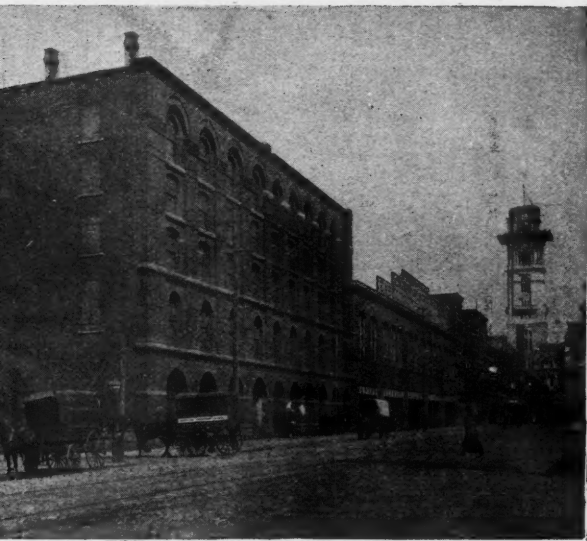


Fig. 25—Market Street, Looking East from Eighteenth. April 24.

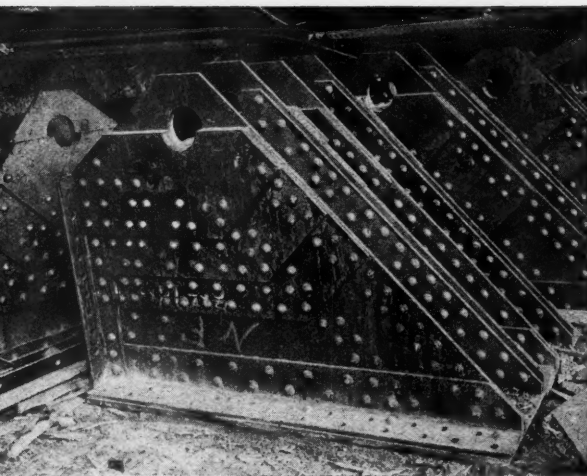


Fig. 20—Foot Members (Inverted).



Fig. 21—Bottom Sections of Arches 5 and 6, 7 and 8, Looking North. May 10.

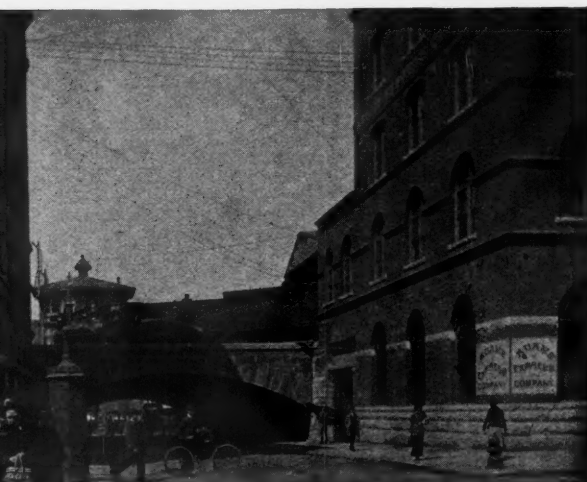


Fig. 26—Seventeenth Street, Looking North from Market Street. April 24.





WESTERN RAILWAY CLUB COUPLER TESTS—TABLE NO. 1.

Name of Coupler.	Material in coupler.	Material in knuckle.	Weight, lbs.	Weight of knuckle.	Weight of other parts.	No. of parts.	Length of shank from stop to end of shank.	Dimensions of shank, inches.	Shape of cross section of shank.	Lot for cont. draft pigging.	Lugs for draft sprg yoke.	M. C. B. Gauges fit as follows.	Contour measurements.						Silicon.	Phosphorus.	Manganese.	Carbon by color.	Graphitic carbon.	Combined carbon.				
													A	B	C	D	E	F										
American.....	Cast steel	Cast steel	210½	50	160½	5	21¼	5 × 5	Circular	Yes	No	.....	2½	1/10	3 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	.....	.050	.075	.86	.28	.....	.....	
Brown.....	Cast steel	Cast steel	220	39	181	7	21	5 × 5	Circular	No	Yes	.....	2½	1/16	3 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	.....	.027	.116	.71	.14	.....	.....	
Buckeye.....	Mal. iron	Cast steel	219	39	180	7	21	5 × 5	Circular	No	Yes	.....	2½	1/16	3 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	.....	.027	.116	.71	.14	.....	.....	
			226	57	179	9	21¼	5 × 5	Circular	Yes	No	Won't go on	2½	1/16	C	C	C	C	C	C	.....					.....	.....	
			220	57	163	9	21¼	5 × 5	Circular	Yes	No	Won't go on	2½	1/16	C	C	C	C	C	C	.....					.....	.....	
California.....	Cast steel	Cast steel	220½	.....	.....	4	21½	4¾ × 4¾	Circular	No	Yes	.....	2½	1/16	C	C	C	C	C	C	1%	.214	.111	1.03	.30	.....	.....	
Chicago.....	Cast steel	Cast steel	218	54	164	4	21½	5¼ × 5	Square	No	Yes	Won't go on	2½	1/16	C	C	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.....	.....	.....	.....	.....	
			218½	54	164½	4	21½	5¼ × 5	Square	No	Yes	Won't go on	2½	1/16	C	C	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.....	.....	.....	.....	.....	
Chicago.....	Cast steel	Cast steel	220	54	166	7	21	5¼ × 5	Square	No	Yes	Won't go on	2½	1/16	.....	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.....	.....	.....	.....	.....	
			220	54	166	7	21	5¼ × 5	Square	No	Yes	Won't go on	2½	1/16	.....	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.....	.....	.....	.....	.....	
Drexel.....	Cast steel	Cast steel	217½	60	157½	5	21¼	4½ × 5	Circular	No	Yes	Won't go on	2½	1/16	.....	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.191	.103	1.06	.30	.....	
			216	60	156	5	21¼	4½ × 5	Circular	No	Yes	.....	2½	1/16	.....	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.....	.....	.....	.....	.....	
Hinson.....	Mal. iron	Cast steel	222	51	171	5	21½	5 × 5	Circular	No	Yes	.....	2½	1/16	1/4	1/4	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.652	.161	2.8	.....	2.19	.58
			217½	51	166½	5	21½	5 × 5	Circular	No	Yes	.....	2½	1/16	1/4	1/4	1 1/16	1 1/16	1 1/16	1 1/16	1	.....	.....	.....	.....	.....	.....	
Mather.....	Mal. iron	Cast steel	204½	36	168½	5	21¾	5 × 5	Circular	Yes	No	.....	3	.....	5/16	1/8	1/8	1/8	1/8	1/8	1/8	.....	.....	.....	.....	.....	.....	
McConway.....	Mal. iron	Wrt iron	220	37½	182½	4	21	5 × 5	Circular	No	No	Correct	3	.....	C	C	C	C	C	C	1/8	.....	.....	.....	.....	.....	.....	
			201½	.....	.....	.....	21½	5 × 5	Circular	No	Yes	Won't go on	2½	1/16	1/8	1/8	1/8	1/8	1/8	1/8	1/8	.....	.337	.097	1.29	.30	.....	
Perfected.....	Cast steel	Cast steel	200	.....	.....	.....	21½	5 × 5	Circular	No	Yes	Won't go on	2½	1/16	1/8	1/8	1/8	1/8	1/8	1/8	1/8	.....	.195	.088	1.32	.25	.....	
Pooley.....	Mal. iron	Cast steel	204	.....	.....	4	21¼	5 × 5	Circular	No	Yes	G'd arm ¼" out	3	.....	1/4	1/4	1/4	1/4	1/4	1/4	1/4	.....	.....	.....	.....	.....	.....	
			108	.....	.....	.....	21¼	5 × 5	Circular	No	.....	.....	3	.....	1/4	1/4	1/4	1/4	1/4	1/4	1/4	.....	.....	.....	.....	.....	.....	
Simplex.....	Cast steel	Cast steel	200	42	158	6	21¼	4¾ × 5	Circular	No	Yes	.....	2½	1/16	.....	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	.....	.026	.061	.63	.31	.....	
			191	42	149	6	21¼	4¾ × 5	Circular	No	No	.....	2½	1/16	.....	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	.....	.088	.062	.50	.29	.....	
Standard.....	Mal. iron	F'g'd steel	206½	67½	139	3	21	5 × 5	Circular	Yes	No	Won't go on	2½	1/16	C	C	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	.....	.....	.....	.....	.....	.....	
			206½	67½	139	3	21	5 × 5	Circular	Yes	No	Won't go on	3	.....	C	C	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	.....	.....	.....	.....	.....	.....	
St. Louis.....	Cast steel	Cast steel	214½	.....	.....	5	21½	5 × 5	Circular	No	Yes	.....	3	1/16	1/8	1/8	1/8	1/8	1/8	1/8	1	.....	.058	.074	.87	.26	.....	
			217	.....	.....	5	21½	5 × 5	Circular	No	Yes	.....	3	.....	1/8	1/8	1/8	1/8	1/8	1/8	1	.....	.....	.....	.....	.....	.....	
Trojan.....	Mal. iron	Cast steel	213½	50	163½	.....	21½	5 × 5	Circular	Yes	No	.....	2½	1/16	3/16	1/8	1/8	1/8	1/8	1/8	1/8	.....	.554	.160	.32	.....	2.93	.24
Williams.....	Mal. iron	Cast steel	202	.....	.....	7	21½	5 × 5	Circular	Yes	Yes	Won't go on	2½	1/16	1/8	1/8	1/8	1/8	1/8	1/8	1/8	.....	.....	.....	.....	.....	.....	
			215	.....	.....	7	21½	5 × 5	Circular	Yes	Yes	Won't go on	2½	1/16	1/8	1/8	1/8	1/8	1/8	1/8	1/8	.....	.....	.....	.....	.....	.....	
Sargent.....			220	.....	.....	.....	21¼	5 × 5	Circular	Yes	Yes	Correct	3	1/16	C	C	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	.....	.....	.....	.....	.....	.....	

Fracture.

[illegible]

The complete disregard of any attempt on the part of the majority of the manufacturers to conform to the C. B. contour lines, as called for by the association's maximum and minimum gauges, should call for some vigorous action on the part of the members of the association. That vertical bars should be sent for test at will not couple with each other seems an astonishing fact, but is none the less a true statement and may be expected to continue just so long as railroad companies are indifferent and careless about the matter. Each railroad company should have at its store a set of the Pratt & Whitney standard gauges and check up on them all vertical plane drawbars purchased. Bars which are sent on the road that will not couple together are a source of danger and undo the very object automatic bars strive to remedy. There is no safety accomplished in having to couple together two vertical plane couplers with a link and pin.

the one used with the Miller hook. The lock of this coupler consists of a block held at one end by a ball joint instead of by the pivot as shown in the cut. The free end of this block has considerable vertical motion and the tail of the knuckle bears against it when locked. To unlock this coupler the transverse bar projecting at the left of fig. C is pulled out, raising the lock to the position shown by the dotted lines, thus freeing the tail of the knuckle and allowing it to swing open. A further movement of this transverse bar brings the offset on the lower side in contact with a small lever shown in section on fig. C and in plan on fig. D. This lever is hung on a vertical pivot, and the opposite end acts against the back of the knuckle, throwing it open if the knuckle is free to turn. In any case, the block will be held in the raised position until the knuckle is again thrown back to its place or the bar pushed back. If it is desired to place the lock in such position that the coupler will not lock when the knuckle is closed the transverse bar, before referred to, is pushed in, thus holding the lock open as before, but leaving the parts in such relation to each other that the



coupler cannot lock until the transverse bar is drawn from that position. There is also connected with the ordinary or rigid shank bar a device for unlocking the coupler in case the drawbar is pulled out.

It will be observed that the locking arrangement of this coupler is so covered and protected as to prevent

#### The Thurmond-McKeen Coupler and Platform.

The illustration herewith gives a good idea of the Thurmond-McKeen improved passenger coupler, carry iron and continuous platform. Isaac G. Johnson & Co. are the sole lessees, and they have worked assiduously

with the constant pushing-out incident to the pull upon the drawbar. This adjustment is so made and the position of the buffer springs so arranged with regard to the drawbar springs that part of the buffing blow is taken on the drawbar spring before the platform springs are exhausted, which very much diminishes the jar

caused by coupling. There are no lock springs in the coupler, as none are required to keep it coupled, and none therefore to get out of place or require repair. The platform and coupler can be applied to the Miller platform without change in the timbers. The company has from 10,000 to 15,000 couplers in use at present, and from the experience with them have designed this improved pattern with the feeling that it can be offered to railroads with entire confidence.

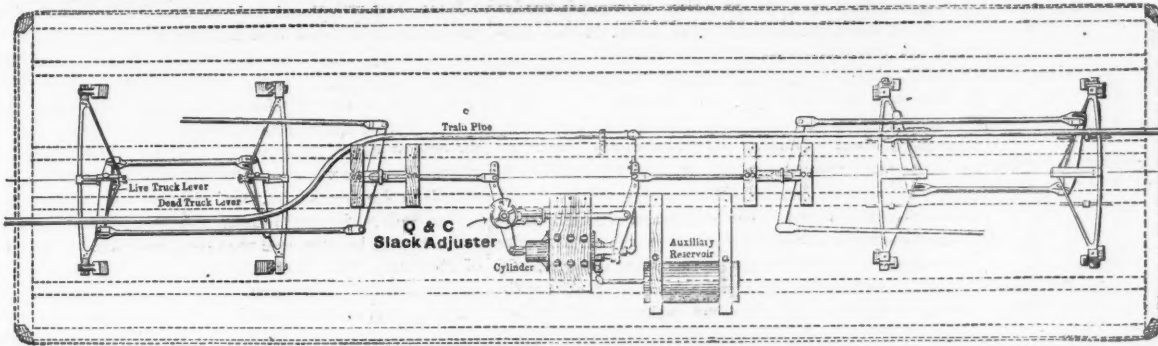


Fig. 1.

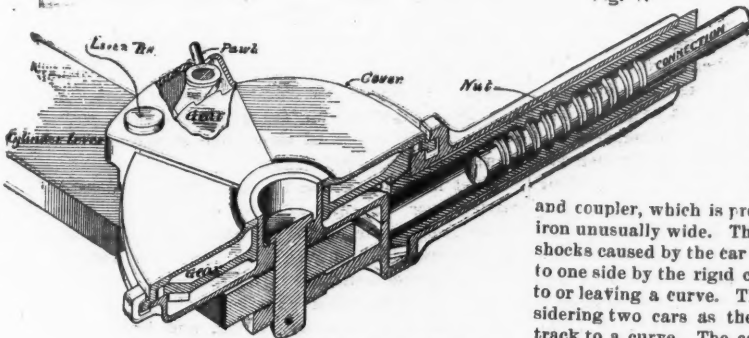


Fig. 2—Section of Adjuster.

#### The Q & C Brake Slack Adjuster.

snow or ice from getting inside and interfering with the free action of the parts. The rod operating the lock is very simple, consisting on freight equipment only of a rod properly connected to the transverse bar and running to the side of the car where it terminates in a simple handle, there being but one motion required to operate the lock. For passenger equipment a plain bar is needed, fastened at one end to the end of the Miller lever, and at the other to the locking bar.

Couplers of these three types are now in quite extensive use on some of the Western roads. The jointed drawbar of the Miller type is now the only one in use on the famous Georgetown loop. Previous to the adoption of this bar, link and pin couplings were used.

#### The Q & C Brake Slack Adjuster.

An illustration is given this week of the Q & C Brake Slack Adjuster which the Q & C Company of Chicago has had in service for some months. This service has been on several different roads and, under trying conditions of winter weather, has given good results. The company express confidence in its giving satisfaction.

The adjustment is accomplished by reducing the length of the middle connection between the brake levers as the shoes wear away. The device consists of a screw (welded on to the end of the middle connecting rod instead of the usual jaw), a nut into which the screw works, a gear to rotate the nut and take up the slack and a pawl to actuate the gear (see fig. 2).

The whole is inclosed in a case, the cover of which (fig. 2) is free to rotate about its central connection, which is a pin passing through the centre of the adjuster and connecting it with the cylinder lever (see fig. 2).

Besides this a pin extends through the cover at its outer circumference and through the lever, so that a movement of the cylinder lever in either direction rotates the cover about its centre and carries the pawl with it (fig. 1).

The distance which the pawl travels is therefore governed by the movement of the lever and varies, of course, with the piston travel (fig. 1).

If this movement is such, the pawl, in the application of the brake, slips over a new tooth in the gear (see fig. 2), and as the brakes are released the lever, returning to its normal position, carries with it the cover and pawl and turns the gear (through the engagement with the new tooth), thus revolving the nut. The cylinder tie rod being threaded to fit the nut, and being engaged in it, is shortened by the rotation of the nut and the slack taken up, thus maintaining the piston travel at a desired distance.

The adjuster is made of such dimensions as to shorten the connecting rod more than is required by the thickest shoes.

When new shoes are to be put in the adjuster has simply to be let out by releasing the pawl by hand and unscrewing the nut with a wrench.

What especially commends this adjuster to railroads is its simple application, requiring as it does nothing but an extra hole in the cylinder lever and replacing the connecting rod by one with the adjuster attached; and these changes are made at a part of the car that is very easy of access.

to perfect the equipment, and now offer it to railroads in what they believe to be a thoroughly practical form. Several features of this coupler and attachments are worthy of special notice.

One feature is that of the lateral play of the drawbar and coupler, which is provided for by making the carry iron unusually wide. This is done to avoid the jars and shocks caused by the car being crowded or thrown over to one side by the rigid coupler when the car is passing to or leaving a curve. This may be understood by considering two cars as they are passing from a straight track to a curve. The coupler of the car on the curve would not be over the centre of the track, the car being pivoted at the truck, while the coupler of the car upon the tangent would be over the centre of the track. The two cars being coupled together both couplers must be at the same point, which results in the crowding of the one car upon a curve to the inside of the curve and the car upon the tangent to the outside rail of the track. Trains going at a high speed feel this crowding as a jolt which the McKeen iron is designed to avoid. It is this crowding that renders it so difficult to couple cars at points of curve and which often requires that links shall be used in drawing cars over sharp curves in the yard. The same phenomenon is what determined the form of the drawbar on the Manhattan Elevated railroad, and the Thurmond-McKeen coupler may be compared to the Manhattan coupler, with guiding springs upon both sides. This lateral motion of the drawbar in running is steadied by the springs, as is shown in the cut.

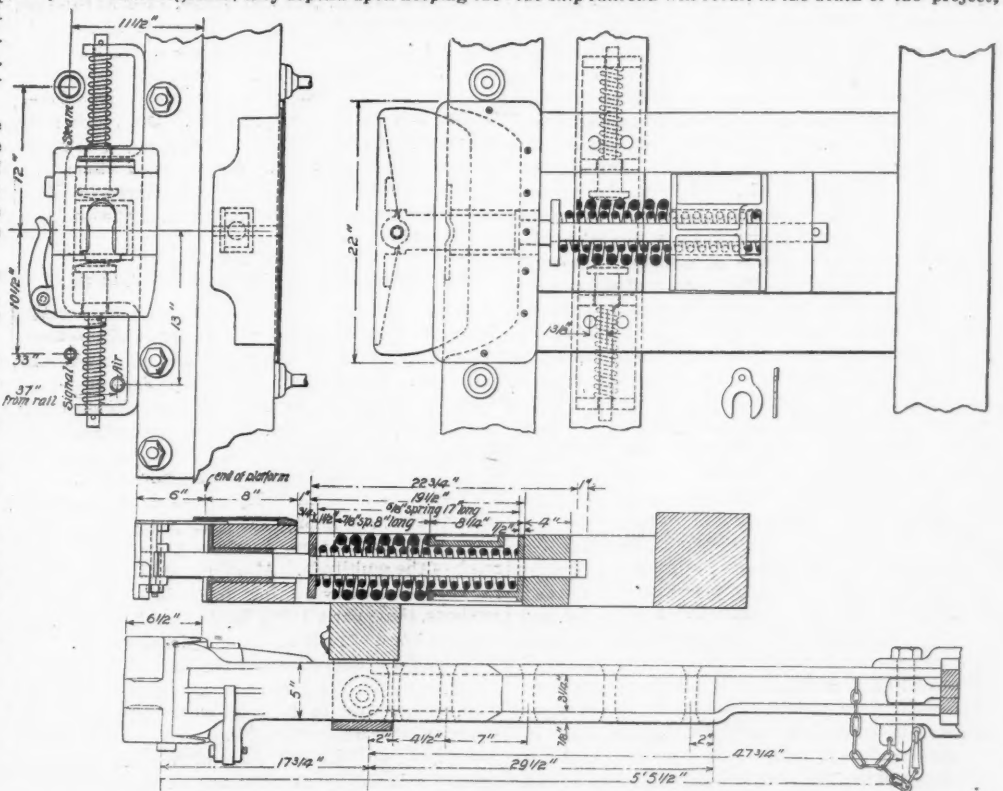
Another feature is that instead of using push bars to keep the buffers together, they depend upon keeping the

#### Galvanized Wire Fencing.

Barkley & House, 1133 "The Rookery," Chicago, have made a contract with the Bangor & Aroostook road for 100 miles of their 7-wire railroad fence, using No. 9 galvanized wire and galvanized wire stay-guards. This style of fencing is becoming very popular with railroad companies, especially in states where barbed wire is prohibited, on account both of its cheapness and durability, it being the next cheapest fencing to common barbed wire, more durable and a better stock turner. In building this fence the wires are first put on and strained up with Australian stretcher-fasteners, which are left on the straining posts so that wires can be tightened at any time; the wires are not stapled tight to the intermediate posts but are allowed to play through staples freely when any pressure is brought against them, and will immediately return to their place when the pressure is removed. The stay-guards are put on so as to break joints between two spaces, which link the wires together, so that any pressure on one wire is carried to the balance of the wires in the fence, which makes its resistance much greater than when the wires are put on without stays and stapled tight to every post.

#### The Chignecto Ship Railroad.

A dispatch from St. John, N. B., says that the Chignecto Marine Transport Company has failed to float a new issue of bonds for \$1,600,000 on the London market. Nearly \$1,000,000 has been expended on this work, and the \$1,600,000 was to have completed it; but although the Dominion Government had promised a yearly subsidy of \$175,000 for 20 years after the completion of the railroad, the money could not be raised. It is feared that this failure to secure money enough to complete the ship railroad will result in the death of the project,



The Thurmond-McKeen Coupler, Carry Iron and Continuous Platform.

long buffer spring adjusted. This is done by filling in behind the spring as it becomes weak with open shaped washers, one of which is shown in the illustration at the right. Also, this absence of connection between the drawbar and buffer cheapens the cost of repairs, and the wear of the buffer springs is diminished by doing away

and will also cripple another proposed ship railroad—the Hurontario—which is a much more ambitious scheme, some 60 or 70 miles, as against 17 miles for the Chignecto. This is unfortunate, as it is highly desirable to have this method of transportation tried to demonstration.



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#### EDITORIAL ANNOUNCEMENTS

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Professor John C. Wait, of the Engineering Department of Harvard University, has joined the staff of the *Railroad Gazette* as Associate Editor. He will do editorial work in connection with the journal itself, but for some months his special work will be in editing the new edition of "The Car Builders' Dictionary." Mr. Wait has had considerable experience in construction and maintenance of way, in the engineering departments of various railroads, many years' experience in designing and building cars and trucks, and six years teaching engineering subjects at Harvard, his specialty having been railroad engineering. His headquarters will be at the New York office.

Such of the results of the Western Railway Club's coupler tests as we have been able to procure appear on another page. The conclusions of Mr. Godfrey W. Rhodes, Chairman of the committee, are clearly expressed in the report as printed and need not be repeated here. In general, the tests have shown that it is a comparatively easy matter to make a coupler of either malleable iron or steel which will stand both the pulling and drop tests, and in this way the justice of the two blows at 15 ft., which has long been a matter of doubt, has been established. The next vital matter on which more light is needed is the strength of the guard arms of couplers that stand the tests as now made. We must confess an error in judgment about the guard arm tests that incidentally accompany the present drop tests. It appears that when the coupler is a strong one the guard arm does not get much of a test from a glancing blow, but when the coupler is weak, the guard arm is invariably knocked off. The principal lesson to buyers is that the market abounds with couplers of poor material, and inaccurately made. In some cases they will not couple with each other. These are not only expensive to maintain, but exceedingly dangerous. Buyers should reckon the incidental, and by far the larger, cost of damages resulting from coupler breakages before deciding to purchase at the lowest market price, and in no case should a coupler, any more than an axle, be put in service that is not correct in dimensions and that does not meet the standard requirements when a standard is adopted; meantime they should meet the proposed tests in every particular. It is evident that this agitation of the coupler test question by both the M. C. B. Association and the Western Railway Club has already had a wholesome effect, and has been the cause of many changes in patterns and designs; and has forced the purchase of better grades of pig for malleable iron and steel making.

An interesting experiment in co-operation is announced by the Directors of the Illinois Central in the form of a plan to enable officers and employees of the company to invest in the company's stock. This has

been under consideration for some time, and has been put into definite shape by a circular signed by President Fisher, recently issued. While the company has no stock for sale, it will assist any of its officers or employees to buy one share at a time, at a market price to be fixed when the application is made, and the purchaser may pay in sums of \$5 or multiples thereof. On the amounts paid in, interest will be credited at the rate of 4 per cent. per annum, and when the total credit amounts to the price at which the stock was bought the certificate will be passed to the purchaser, when he can begin the purchase of another share. The money paid will be returned with interest if the purchaser wishes. If he leaves the service he must either pay in full or take back the money already paid in, with interest. Of course, he can purchase larger numbers of shares for cash if he desires. The obvious purpose, and it is a very admirable one, is to interest employees of all classes financially in the success of the property which they are working, and nothing could be more desirable than to distribute the shares among the men most directly concerned in making them profitable; the effect on the spirit of the men, although they hold but one share, will be immediate and must be good. The probable outcome of the scheme is, of course, very uncertain. It is impossible to foresee how many men will choose this form of investment rather than to put their savings into the purchase of homes or into savings banks. While railroad securities in general are not a very attractive form of investment now, the stock of the Illinois Central has long been a good investment and there is no reason in sight why it should not be as good in the future as it has been in the past. For the last seven years, at least, its dividends have amounted to about 5½ per cent. on the market value of the stock and have run from 5 to 7 percent. on the par value. The recent heavy expenditures of the company in improving its Chicago terminals are of a kind to make the stock safer and more valuable than ever. The possible purchases by employees will represent but a small percentage of their total earnings, for a conductor, a station agent or a mechanic in the shops can save but very little for investment. Still, small as these purchases must necessarily be, they will at once change materially the attitude of the men's minds toward the company. One feature of the plan, of particular value to the men, is the convenient form of investment that it gives for those who are stationed in districts remote from savings banks, and to such men a chance to invest small sums monthly in a safe and convenient way would, naturally, be attractive. Whether or not this plan will be more popular than that of establishing a savings department, pure and simple, such as those of the Baltimore & Ohio and the Pennsylvania, which have been maintained for several years, remains to be seen. The Baltimore & Ohio institution showed deposits of about \$700,000 by its last annual report and the Pennsylvania showed \$1,149,000. The latter road expended \$5,000 during the year for operating expense of the savings department. The terms on which this scheme is laid before the men are liberal and attractive, and everybody interested in the welfare of the railroads must hope for its success.

#### Standard Trucks and Frames for Freight Cars.

Railroad managers have long known that standards reduce the first cost and cost of repairs of all mechanical devices, and the records of the Master Car Builders' Association show this. In every department of mechanic arts this is as true as it is in railroad work; sewing machines, bicycles, watches, agricultural tools, stationary engines, pumps, etc., would not have the widespread and universal use they now have were it not for the fact that the adopted standards of dimensions and the interchangeability of parts have led to a first cost so low that the purchase price is within the reach of the multitude. Also the cost of maintenance has been lowered by making duplicate parts by cheap methods, these parts being kept in stock at prices far below the cost of making a single piece by itself.

Perhaps the duplication of the sizes of iron pipe by all pipemakers, and the standard sizes of bolts and nuts, come nearer to the point we are trying to make than any other illustration. Nearly every manufacturer uses piping or bolts and nuts, and the cost of repairs is greatly reduced by the existence of these standards. All of this illustrates a principle in manufacture which is consciously or unconsciously followed by all. It is that routine production reduces cost of labor. So practical is this rule that it is followed everywhere in a general way, but it is more closely adhered to in the United States because of the high cost of labor. In some cases the products suffer where this rule is followed, as there is always a temptation to use unsuitable parts to avoid changes in sizes and designs, but on

the whole the result is a saving to all concerned, and one that is directly brought about by the selection of a fixed line of products and a close adherence to uniform dimensions.

In car work there are now many standards, and the vast amount of labor that has been saved by uniform dimensions is fully appreciated by no one, not even those who have most to do with car repairs. A limited conception of what uniformity has done for railroads can be had by speculating on the probable increase of the cost of car repairs that would have been required if we did not now have uniform ruling dimensions of wheels, axles, drawbars, brakebeams, air brake hose and cylinders, journal brasses and axle boxes.

It is not to be supposed that the limit of the adoption of standards has been reached, for that would be a practical acknowledgment of the end of progress. It may appear to some—and this is suggested by the recent discussion at the New England Railroad Club (see *Railroad Gazette*, May 19)—that the progress in standards is at a standstill; but this is far from the fact. Several committees are to report this year on proposed uniform construction, but, fortunately, the Master Car Builders' Association is a conservative body, and therefore standards are adopted slowly, as they should be, and not until they have shown their universal fitness in actual service.

What is most needed to gain the least cost of carriage per ton-mile is a set of standard, metal-frame freight cars, with uniform trucks, but with present knowledge it would be foolhardy to attempt the selection of a suitable type; foolhardy, because in the first place there is no experience with metal frames that would serve as a safe guide, and in the second place we have but a vague idea of what is the most desirable or the most durable truck. Nearly every railroad mechanic and engineer has his own conviction in the matter, but there is no concert of opinion. Take such a large factor as the swing motion as an instance; there is no agreement about it. Evidently it is either useful or it isn't. Altogether it now appears that those who use it do so as much from force of habit as for reason; still it continues in use and large sums of money go out yearly to maintain it. Some large roads call such use of money a waste, and it is so if no useful purpose is served by a lateral-motion truck that swings about ¼ of an inch each way. But whether it is or is not useful, it serves to illustrate the futility of an attempt to establish a standard truck for all roads and to suit all designs. Undoubtedly it would be very unfortunate to adopt a standard truck with a swing motion, and likewise it might be a loss to choose a diamond type of truck frame. The best that can be done is for each road to adhere closely to the best modern practice for all new equipment and avoid making any more types than now exist.

About three-quarters of the cost of all repairs to good modern freight cars comes in the wearing details of the trucks. Beyond this the repairs are about equally divided between the car body and the truck details that are not strictly wearing parts. For the wearing parts there are standards already adopted; the next step is naturally to choose uniformity for those parts that fail by breakage and by decay. As such parts are more expensive to make than the parts which wear, and as the strains and stresses to which they are subjected are more variable and uncertain, it is very desirable that uniformity be put off until there is some substantial evidence about the best attainable type.

Few parts, of a good cheap material, so well joined as to remain fast in position, is a general description of the ultimate freight car truck. It will be a lighter truck than the present by 50 per cent. in proportion to its carrying capacity, and will be adapted for higher speeds, for the coming freight-train schedule will be not much behind the present passenger speed. This is now true of the freight service on several Western roads out of Chicago. Standing face to face with rapid developments in material of construction, changes in speed and many uncertainties about the fitness of prevailing designs, one cannot fail to be impressed with the inadvisability of attempting to choose a uniform freight car truck.

At the New England Railroad Club one enthusiast proposed the Fox truck for a standard, but no one has taken him seriously. The subject is altogether too important to be trifled with, and although the Fox truck has much in its favor, and probably promises more for the future than all other trucks combined, it would be folly to make it a standard for this country while so little is known about it here. Let the manufacturers of the truck keep on as they have and make all of their trucks perfectly interchangeable and let those who admire it, and many do, use it where they can, and then if it be the ultimate



plan it will, in that way, have a fair chance to work out its own salvation and by its greater durability and saving in weight and cost of maintenance push the more common types from the field. It has done this in India and in some of the larger English colonies, also in Sweden and Norway. If it has the merit it appears to have it can as easily establish itself here.

So, one might argue about the frequently proposed standards for metal underframes; as with trucks, we do not know what is best. The committee on steel centre sills after an exhaustive research has only been able to say that experience so far gives no conviction as to the probable results of extended use. All know the results of the attempts to use steel tender frames. Generally they are discarded on large roads on account of the delay caused by minor wrecks, which disable the tender and thus cripple the locomotive. Wooden frames are repaired quickly and with the common class of labor. Steel ones have to be sent to headquarters, and require good mechanics.

As we have often said in these columns, steel frames are standard for all classes of cars, both freight and passenger, in nearly all countries but the United States. The universal report is a low cost for repairs, but abroad operation is different and the shocks of service less severe; besides, cars abroad are repaired when repairs are needed, not when they fail to be safe to run, as is the case here.

If some of our progressive roads would take up this matter and build perhaps 1,000 cars with steel underframes, or at least steel centre sills, and do the work in the same thorough way that bridge work is done, there would be within five years' time some practical knowledge, of real value, that would bear upon the subject and be a safe guide for the future. Steel sills can now be purchased in large quantities for about \$40 a ton, and at this price there is little difference between the cost of steel and wood.

The question of what to do to get more durable car sills is a live one, and a full and free discussion at the coming conventions may bring out some new facts. Otherwise there is little to hope for but to go on in the same old "build up and smash up" way that has been regular practice ever since the introduction of heavy locomotives and the practice of hauling long trains. It may be that one or more railroad companies will be willing to make an attempt at something better and try a few cars with a sill construction that is in keeping with the development of the use of metal in other engineering work. Freight car construction requires a high order of mechanical design—perhaps this is best seen from the many failures of good mechanics in this field. Above all else is needed a broad and general knowledge of the use of materials; cars must be light and strong, durable and inexpensive. All of this makes real improvement come slowly, and this slowness is what makes the enthusiast feel that development is at a standstill. One thought must be a consolation to the steel-car advocate: there is now so much metal in a car underframe that there will soon be more in weight than will make a steel centre sill. This increase in metal and the use of a heavy subsill of oak, now common, so complicates the construction and increases the weight that a change to steel sills will eventually follow in the natural order of things.

#### The Janney Coupler Record.

In the years past we have been able to publish careful records of coupler failures, furnished to us by the McConway & Torley Co., and on another page appear tables giving the relative frequency of breakages of different parts of Janney knuckles and couplers for seven years and three months. We do not publish with these tables the diagrams showing the classification of the various breakages, for this classification has now become so familiar that it is probably well understood without the diagrams.

One matter of interest which strikes one on the first inspection of the tables is the bearing of these records on a matter referred to in an editorial in our issue of May 26; that is, the destruction of cars by rough handling in freight yards. In this respect the lesson of the tables is very apparent. The breakages that would naturally occur to couplers from running the cars together would be, first, the upper lug of the knuckle owing to the fact that the coupler sags more or less, and that the upper lug is the first part to strike; and, second, the guard arm. Further, where cars are run together with such a blow as to break the lug off, the record of lugs off would naturally be considerably higher than that of lugs cracked. It will be seen by inspection of the knuckle table that there are 11 roads in which the record of "upper lug off" runs above the general average of that breakage, and that in almost every one of these instances the record of "upper lug

cracked" is below the general average. It will be seen also that the roads which have the greatest proportion of upper lugs off have also the greatest proportion of arms off. The same roads generally show a high average of knuckles with the tail broken off and of knuckles with both lugs off. There seems, therefore, to be plenty of justification from these figures in assuming that the railroads that report such great destruction of these particular parts of couplers are unfortunate in having their cars very roughly handled. Why they should be especially unfortunate in this way it is not worth while to conjecture. The means of forming an intelligent judgment are certainly not included in the record now printed; but we take this occasion to renew the suggestion that it would be quite practicable to save a good many couplers by giving the men special inducements to handle cars carefully, and, further, to renew the suggestion that it might be a pretty good notion to get up a premium system for economy in freight yards.

Another interesting aspect of these tables is the confirmation which they give of Mr. Waitt's records published in our issue of April 7, which showed that far the greatest mortality of the coupler bodies is in the guard arm. The Janney records confirm pretty accurately Mr. Waitt's record of arms broken. His classification gives but one heading, under which evidently he includes all injuries to coupler arms; and for the six months, April 1, 1892, to Sept. 30, 1892, his report of arms broken is: foreign cars, 79 per cent.; home cars, 84 per cent.; total, 82 per cent. The Janney records for the whole of the year beginning April 1, 1892, show arms off, arms cracked and arms chipped on the Lake Shore, 85.67 per cent., and the average for all roads 79.64. It will be seen that all other failures of coupler bodies are very small compared with these.

The table of the distribution of breakages of the Janney coupler gives the following general averages:

	Jan. 1, 1886, to Mar. 31, '92.	April 1, 1892, to Mar. 31, '93.	Jan. 1, 1886, to Mar. 31, '93.
Guard arms, broken or cracked.....	52.51	67.05	60.64
All guard arm defects.....	64.08	79.64	72.78
All lug defects.....	10.62	8.02	8.90
All breakages and defects at back.....	6.36	3.82	4.94

In the light of these records it is to be regretted that the recent tests by the Western Railway Club did not include a guard-arm test. If it had there would have been a chance to learn if the results of shop tests are borne out in practice.

From the complete table it is gratifying to learn that so few couplers break off back of the head where it joins the shank. This has been assumed by some to be a seriously weak point, and many are the devices that have been brought out to hold up the heads when they are broken off. A considerable number, about 4 per cent. of all breakages, broke in the barrel, and nearly the same number were worn through at the tail bolt. Altogether the breakages are small outside of the lugs, guard arms and locks. With these parts strengthened the breakages would be nearly uniformly distributed. To gain greater strength in the guard arm may require a departure from the M.C.B. standard, not in the contour, but in the depth or length of the head.

It is of some interest to notice the changes in the percentages of casualties to couplers in the various periods. The tables cover three periods; Jan. 1, 1886 to March 31, 1892; April 1, 1892, to March 31, 1893; and finally, period 3 is for the whole time from Jan. 1, 1886, to March 31, 1893. It will be seen that in the second period the percentage of arms off increased over the first period somewhat, and that the total injuries to arms increased from 64 per cent. to 84 per cent. How this increase is to be accounted for it would be hard to say, unless it is because of the greater number of M.C.B. couplers in service, causing a greater number of blows to be delivered on the arm.

Few of the other classes of injuries have increased, those that have increased being "back out," "upper lug off" and "upper lug cracked." It will be observed that the injuries classified under "draft bolt pulled through," have fallen off from 3.08 per cent. in the first period to 1.96 in the second, an improvement that is probably mostly due to the use of a strap instead of a tail bolt.

In the knuckles we find that while the injuries classified as "upper lug off" have decreased 2 per cent., and those of upper lug cracked have increased 7

per cent., the total injuries to the upper lug of the knuckle have increased 2 per cent. The injuries to the lower lug have decreased and the class of injuries recorded as "both lugs chipped" has fallen from 3.52 to 1.50. This is a more important item than appears at first sight. This class of injuries is doubtless largely due to weak or bent coupling pins, and it is a kind of injury which, when started, leads to still other sorts. The reduction therefore by the use of a stiffer pin and one that cannot be removed from the knuckle is an encouraging feature of the record.

#### Charges for Power at the World's Fair.

A good deal has been published by the American press and more doubtless expressed *via voce* by the exhibitors, about the prices charged for power at the World's Columbian Exposition, and now the European papers, general and technical, are giving space to the same general complaint. Like most everything else, we suppose there may be two sides to the question, but so far we believe but one party has made its side heard.

No doubt \$80 per horse power for six months is an almost unheard of price for power made and supplied under the very favorable conditions that attend those at Jackson Park. The cost of installation of engines, of shafting, etc., is of course great, and when deducted from the revenues for the short time that exhibitors use power they would leave little profit. But most, if not all, of the power plant is furnished by exhibitors, for the purpose of displaying their engines, generators or motors, which relieves the Exposition of an important item of expense—the interest on the capital invested in engines and boilers.

It is well known that power can be generated under favorable circumstances at from \$15 to \$25 per horse power per year, and that the most expensive conditions attendant at the Fair would not make a price \$120 per annum per horse power, the rate charged by the Fair people. The power alone probably does not cost the Exposition more than \$10 or \$15 per horse power for six months, and if to that the cost of installation be added it will make an aggregate of not more than \$15 or \$20, or one-third what is charged.

The trouble cannot be laid to the rules and regulations, for the rule with regard to steam and power is in substance the same as that promulgated at all the great exhibitions for many years past. In fact the clauses seem to have been copied verbatim from those of the Paris Exposition of 1878-1889 and of the American exhibition of 1876. The general regulations state that a limited quantity of steam and water power will be supplied gratuitously, that limited quantity to be decided, and any excess over that quantity, and the price for it, to be determined at the time the space is allotted. This price does not seem to have been determined when it should have been, so that now the price is determined by the Exposition people, after the exhibits have been installed and at a time when they cannot be withdrawn, according to the agreement between the authorities and the exhibitor.

No doubt exhibitors were justified in expecting that the prices should be reasonable, and somewhere about the cost of production. Certainly if such a contract had been made for a delivery of wheat or pork or iron, there can be but little doubt but that a court would construe it as a delivery at the market price, and not at any price which the seller might choose to demand. Chicago people would have no difficulty in understanding such a business transaction in pork or wheat, and it is difficult to see how they can discriminate in furnishing power.

The exhibitors went into the fold to be shorn when they have left the interpretation of the rule or contract and the adjustment of the price to the Exposition officers. The Fair is an effort to make money, and we do not doubt but that its policy is to reap all the profit it can. On the other side, many of the exhibitors are manufacturing products of their machinery, which are a profit to them pecuniarily as well as by way of advertisement. They may have gone there expecting that the sale or marketing of these articles of manufacture would help to pay the expenses of their exhibit. This will hardly be possible at the prices charged for power.

It seems a mistaken policy to wring extortionate rates and prices from exhibitors whose exhibits are the sum and substance of the Fair, and we cannot refrain from condemning the policy of the administration in following such a plan. Exhibitors have been to great expense in the preparation of their exhibits, they have had to pay the cost of transportation to the grounds, they have been met there at the door with a demand for an onerous toll or entrance fee, and, when once inside with the most stringent regulations, all of which has well nigh culminated in the withdrawal of

\* Totals of the columns are not 100, owing to the averages being taken. The totals are 100 for each individual road.



exhibits. Add to these circumstances the delay on the part of the officials to determine questions and interpret rules, owing to the pressure of business, and to all this the exorbitant demands of mechanics and laborers, and one can imagine the restrained indignation of the exhibitors, and especially of foreign exhibitors.

Of course much of this cannot be charged to the administration. It is a necessary consequence of the short time had to organize and prepare such a stupendous undertaking, but the administration can hardly justify its policy of increasing the costs and augmenting the aggravations throughout the season. The forbearance of the exhibitor has already been severely taxed, and it is the last straw that breaks the camel's back. It is hoped that the administration will see its folly before a combined action of exhibitors compels an undignified compromise.

The *Financial Chronicle* publishes tabulated statements of the gross and net earnings of railroads for the first quarter of the year. A summary is given below:

	1893.	1892.	Inc. or dec.
Gross earn.....	\$61,895,305	\$58,652,387	I. \$3,242,918
Oper. expen.....	43,237,824	40,224,251	I. 3,013,573
Net earn.....	\$18,657,481	\$18,428,136	I. \$229,345

	1893.	1892.	Inc. or dec.
Gross earn.....	\$207,909,686	\$202,562,184	I. \$5,347,502
Oper. expen.....	150,287,453	142,591,603	I. 7,695,850
Net earn.....	\$57,622,233	\$59,970,581	D. \$2,348,348

It requires but a glance to see that the net results for March must have been more favorable than in January and February, since the increase for that month still leaves a decrease for the quarter. The Western roads had a severe winter, and in March were just beginning to make up some of their traffic losses. It must also be remembered that the earnings, both gross and net for March, 1892, were very large, showing heavy increases in many cases over that month in previous years; so that any gain at all in 1893 shows strength.

There are some marked differences between the increases and decreases for the quarter, for the several groups of roads. The following table also from the *Chronicle* shows the changes in detail:

Group.	Gross earnings.		Net earnings.		I. or D.
	1893.	1892.	1893.	1892.	
Jan. 1 to Mar. 31.					
New Eng. (15).	16,526,870	14,638,492	4,499,793	4,195,150	+ 7.26
Trk lines (16).	65,124,996	65,524,563	15,731,276	17,744,715	- 11.35
Anth. coal (11).	19,041,110	13,547,912	4,571,933	5,193,625	- 11.96
Middle States (29).	9,255,661	8,223,042	3,088,020	3,022,141	+ 2.18
Mid. Western (28).	11,608,467	11,254,624	3,395,906	3,513,677	- 3.35
Northw. (13).	21,020,030	21,079,424	6,957,577	7,018,565	- 13.69
Southw. (14).	23,257,434	21,620,935	6,929,417	5,475,908	+ 8.28
Pac. Coast (19).	26,144,077	26,243,421	7,628,465	7,863,684	- 2.99
Southern (36).	17,842,397	16,892,889	5,697,205	5,101,281	+ 11.68
Mexican (2).	3,088,638	2,848,822	1,022,611	841,351	+ 2.15
Total (181 rds).	207,909,686	202,562,184	57,622,233	59,970,581	- 3.91

In New England the New Haven shows great increases in gross—naturally after absorption of its connecting lines. The Baltimore & Ohio and the Grand Trunk ran behind in the second group. So did the Pennsylvania lines both east and west of Pittsburgh. The Granger roads show about the same gross but a decrease in net, supposed to be due to improvements because of the World's Fair and preparations for that event. The loss on the anthracite group is wholly due to the Reading. Atchison ran heavily ahead in gross and slightly in net. The Southern Pacific shows increases in net, but the Canadian Pacific and Union Pacific show declines. Many Southern roads have also increases, the net results for that group being very good. Taking the bad weather into account, and the financial depression which was slowly coming on all through the spring, the returns for the various sections of the country may be regarded as favorable. Probably more was spent upon the plant from earnings than in March, 1892, or in the first quarter of that year.

The trunk line passenger men have had to devote a day's meeting to hearing complaints about the Delaware, Lackawanna & Western's large share of the World's Fair excursion traffic, and no explanation has yet appeared. This business—that carried at 20 per cent. reduction, on trains running through from New York in 35 hours or more—is said to have been as follows, from May 1 to May 27, inclusive: Lackawanna, 839 tickets; Pennsylvania, 236; New York Central, 133; Erie, 143; Lehigh Valley, 90; Baltimore & Ohio, 75; and West Shore, 70. The Lackawanna is accused of paying commissions on these tickets, but denies having done so, and the accusation is shifted to the Western connections of the road. On the general question of passenger rates to the World's Fair, the daily newspapers persistently continue their arguments and the railroads continue their original policy. The newspaper contention is practically narrowed down to the simple point that the railroads are losing money by not reducing fares. The railroads, if we consider the experience of the trunk lines from New York as a fair sample, find their sleeping cars pretty constantly en-

gaged at present rates; that is, they do not see any necessity of reducing rates to fill such cars. One road says that all its equipment, day cars and sleepers, is fully in use. But assuming that there are plenty of day cars yet to be had, the demand represented by the newspapers is that excursion rates be made low enough to start trainloads of people in these cars. The first objection by the roads to this is that traffic is increasing daily without reduction of fares. It is not claimed that this increase is so rapid as to threaten to strain the facilities of the roads perhaps for two or three weeks yet; but those who ask for a temporary low rate until people do start voluntarily in larger numbers are answered that such a reduction would demoralize rates for the whole season; that rates once reduced could not be restored, owing to the unbusiness-like methods of the weaker lines, who would prolong the life of the low rates in spite of even a large increase of traffic. Experience justifies this view, so that the substance of the answer of the railroads to the newspapers is that, speaking for the whole season, their (the railroads') original argument still holds good, and that the probable time during which a 50 per cent. reduction might be profitable is too short for making the trial. This is doubtless a good business argument, but probably neither the editors nor the public will be convinced by it. Nothing but the results will suffice for that.

The Engineers' Club, of St. Louis, has done an admirable thing in preparing (by committee) a list of the engineering works in St. Louis and its vicinity of interest to visiting engineers. This is the sort of work that the engineering societies all over the country ought to do in this exhibition year, and the sooner they do it the better. The Committee on Information and Courtesy of the American Society of Civil Engineers has collected a good deal of information concerning not only the neighborhood of New York, but the country, which will be available to foreigners who want to find out as quickly and as conveniently as may be the best way to use their limited time when they come here. What other societies have done in this way we do not know, but we are surprised to learn from Mr. Max E. Schmidt, Secretary of the General Committee of Engineering Societies, that he had not heard of the St. Louis pamphlet until we wrote to him, and that he has received no pamphlets or lists of a similar kind from any other organizations. That Committee has been getting up an index of important works from original investigation in its own office, and is preparing five copies of this index, three to be sent to the secretaries of the civil, mechanical and mining engineers and two to be kept in the Chicago office of the General Committee. The St. Louis Club appointed Messrs. Moore, Potter, Meier, Ockerson, Ayer and Johnson a committee to assist visiting engineers, and this committee very hospitably invites visitors to call at the office of the Chairman, Mr. Robert Moore, 52 Laclede Building, corner Fourth and Olive streets, St. Louis, where they will get letters of introduction to managers of works and other practical assistance in seeing things and getting information. The committee says that "by so doing visiting engineers will but give to the engineers of St. Louis an opportunity to return some of the many favors they have received at the hands of engineers of all lands." This sentiment is shared by engineers all over the United States; the feeling of generous hospitality is general, as is the sense of debt to English and Continental engineers for courtesies shown in the past. Wherever foreign engineers find it difficult to get special information or attention in this country it will be, not from lack of the wish on the part of the Americans, but because of failure to get together and organize their hospitality.

The Texas Midland has lately ordered its train and station men to wear uniforms. As this road is but 52 miles long, with about 14 stations, and runs, according to the *Official Guide*, only one train a day each way, it is possible that some of our readers have not heard this news. We feel quite sure that several of them have missed the most important part of it at any rate, viz., that the company allows the employees \$6 each toward buying the required uniform, if the regulation is complied with within a specified time. This is really very generous on the part of the company; but as it has probably less than 25 uniformed men, the plan, in its "last analysis," suggests Mr. Ashley's profit-sharing scheme. That, the reader will remember, was brought forward from year to year; the plan being to distribute to the men a certain percentage of the profits of operation. As the net profits were always a loss the men were never very enthusiastic about sharing them. Still, the Texas road's offer though small in the aggregate is genuine, and means cash, and is generous. And so long as you put men in uniform why is it not a good plan to raise wages sometimes by helping them to buy new suits? You know then that the increase of pay will not go for beer. And we take it that no civilized general manager will deny the value of uniforms; but a shabby uniform is worse than none. Perhaps no one has so well expressed the power of clothes as our old friend Teufelsdröckh. "We see two individuals," he writes, "one dressed in fine red the other in coarse threadbare blue. Red says to Blue: 'Be hanged and anatomised'; Blue hears with a shudder, marches sorrowfully

to the gallows; is there noosed-up, vibrates his hour and the surgeons dissect him . . . Society. . . . is founded upon Cloth." The uniform is the outward symbol of authority; also of obligation and duty; but if it is shabby and dirty the wearer must carry a gun to make it respected.

#### NEW PUBLICATIONS.

*The Permanent Way Pocketbook.* By T. W. Jones, Vice-President Institute of Permanent Way Inspectors. London and Calcutta: Thacker, Spink & Co., 1893.

In this little work, designed primarily for the use of what our British brethren call "platelayers," and especially for the East Indian branch of that fraternity, the author gives the reader the benefit of a score of years spent, not only in active service, but in the observation and study of methods and their results. The book deals chiefly with questions pertaining to curves, turnouts, crossings, etc., but space is found also for the treatment of such matters as cements and mortar, scour at bridges, pitch of roofs, pile driving, etc. From the nature of the case, this work must find its principal field in the land of its birth. Passages like the following, for instance, can have at most but a limited application in this country:

"When the rate of wages is 2½ annas (about five cents) for men, and 1½ annas (about 3½ cents) for women per day, ballast of hard stone 2½ in. cubes can be broken and led any distance up to 1,000 ft. at Rs. 20 (about \$8) per 1,000 cu. ft. . . . One ordinary bullock cart with driver, and one woman to assist in loading, can convey 100 ft. of ballast half a mile a day during dry weather, over ordinary ground where no road exists.

"The average amount of earth excavated and placed on embankment, when the lead is not more than 60 ft., is: One man, 75 cu. ft.; one woman, 50 cu. ft.; one child, 25 cu. ft.

*The Slide Rule.* Third Edition. By William Cox. New York: Keuffel & Esser Co. To which is added the *Duplex Slide Rule.*

The two parts of this pamphlet, which are now published in one cover, occupy 44 octavo pages, and, conveniently bound in flexible cloth, are sold for 75 cents. The whole forms a simple and convenient manual of the slide rule and description of the "Duplex," which is an improved form of the Meinheim, invented and patented by Mr. Cox. The difference between this new slide rule and the Meinheim is that the slide itself is of the same thickness as the rule. Both sides of the slide are graduated, the graduation of the rule being alike on both faces while the scales of the slide are graduated on the upper face in the usual way and on the under face in reversed order. These reversed lines of graduation are equivalent to inverting the slide, but the new form possesses certain advantages. The new rule is sold for \$6.50.

*Journal of the Association of Engineering Societies:* April, 1893.

One of the papers appearing in this issue is by Mr. L. E. Cooley, on the old question of Deep Water from the Great Lakes to the Ocean. There are papers also on "Our Pavements," by John Donnelly; "Technical Education in Montana," by A. M. Ryon, and "Construction of a Wooden Pipe Line," by F. B. Gutelius; but the paper of most importance, probably, is one 20 pages long, by Prof. J. W. Langley on "Some Physical Properties of Steel as Related to its Composition and Structure." This is a development, in somewhat different form, of a paper recently published in the *Transactions* of the American Society of Civil Engineers.

*The Technograph.* Published by the Engineering Societies of the University of Illinois, Champaign, Ill., J. H. Reed, Secretary Board of Publication. No. 7, 1892-93.

The *Technograph* for 1892 and '93, No. 7, is an octavo of 116 pages, containing 18 articles. The first three, on deep pile foundations, are reprinted in this issue of the *Railroad Gazette*. The other articles of especial interest to railroad engineers are: "A Peculiar Instance of Grade Reduction" which discusses a case which occurred on the Belt Railroad at Chicago; an "Analysis of the Relative Cost of Heavy and Re-enforced Bridges;" and, possibly, an analytical paper on "Equivalent Circular Curves for Turnouts."

*Journal of the Franklin Institute.* June, 1893. The most important article in this issue is one of 30 pages on the "Scientific Expert in Forensic Procedure," by Prof. C. F. Hines. There is also a paper of 10 pages on "Rope Power Transmission," by J. N. Dodge.

#### Some Railroad Matters in Chicago.

*Freight Receipts.*—The improvement in the freight and passenger traffic of the railroads centring in Chicago from the interior, which began with May, increased as the month advanced, and the amount handled was much larger than during the same month last year. The only leading article of freight that showed a marked decrease was live stock and hog products, the shrinkage on the former being 4,081 cars, mainly due to the scarcity of marketable hogs. The loss, however, was small compared with the gains on other leading articles of produce and mine products; the increase in coal being 175,054 tons, while grain showed an excess of 4,230,000 bushels over May, 1892. The outward movement of merchandise materially increased and was chiefly of th



class of freight that pays the best rates. For the purpose of giving a more perfect idea as to the grain movement, the following table showing the deliveries by each railroad during May, 1892 and 1893, has been prepared from statements furnished by the railroads. In this connection it is proper to state that the figures for 1893 differ widely from the official figures published by the Board of Trade, because of an error in the figures carelessly furnished the Board of Trade by clerks in the freight departments of a number of leading railroads. These have been carefully corrected for the *Railroad Gazette*. The gains shown were a surprise even to those who most closely observe the movement of such property. The proportion of flour and grain brought in by each road during May compared as follows:

	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
C. & N. W.	Bbls. 84,000	Bu. 2,154,000	Bbls. 80,000	1,024,000
Ill. Cent.	3,000	2,172,000	5,000	982,000
C. R. I. & P.	26,000	1,849,000	20,000	1,407,000
C. B. & Q.	83,000	5,663,000	52,000	2,675,000
C. & Alton	4,000	431,000	17,000	457,000
C. & E. Ill.	2,000	242,000	250	147,000
C. M. & St. P.	91,000	2,739,000	65,000	1,632,000
Wabash	4,000	611,000	10,000	437,000
C. Gt. West.	87,000	516,000	53,000	532,000
A. T. & St. Fe.	3,000	852,000	839	1,160,000
Wis. Cent.	4,000	7,000	16,000	21,000
Totals	391,000	17,236,000	319,139	10,464,000

**Passenger Movement.**—There was a larger increase in passenger than freight traffic, the heaviest gain being in the last half of May, and during the closing week nearly every train brought as many cars as could be handled with economy, and they were well filled. Railroad officers also feel confident of a steady and large increase in such traffic as the summer advances; it is not thought, however, that travel will reach a maximum volume until about the close of July, and possibly middle of August, at which time the small grain will be harvested in all except in the extreme northwestern group of states. This will give the farmers a chance to visit the World's Fair.

**The Flyer.**—There is considerable divergence of opinion among leading railroad men in Chicago as to the practicability of the New York Central and Lake Shore "flyer" trains. A few think they will prove a success and that in a little time all the rival lines will be compelled to put them on in self-defense. Others, however, and among them some of the wisest, think that the flyers will prove a costly luxury. Among other objections, they argue that the wear and tear on track, bridges and rolling stock will be more severe and in consequence entail a higher cost for maintenance. The moderate number of passengers carried is also regarded as a serious question from a revenue point. The intense strain on the trainmen, especially engineers and firemen, is also regarded as a very objectionable feature and one that cannot be overcome. On the other hand, the friends of fast trains insist that the employees will soon become accustomed to their work, and that by proper changes they will do it without extra exertion and prefer it because of the shorter time on their runs. They also contend that, inasmuch as the rolling stock has been built and the tracks put in condition with special reference to fast trains, there will be no extra expense for keeping the rolling stock and cars in condition.

**World's Fair Traffic.**—Ever since the opening of the World's Fair the managers of all the railroads centering in Chicago have been severely criticised for their refusal to make further reductions on passenger rates between this city and every part of the American continent. Those who imagined that the mere announcement that the World's Fair was open would attract visitors hither at the rate of 50,000 to 100,000 a day charge that the failure of visitors to immediately come as predicted is entirely due to the high fares. The grumblers seem to entirely lose sight of the fact that the Chicago papers, as well as the representatives of journals in every city in the country, have from the opening of the Fair to the present unreservedly announced that, although the Fair was formally open, many of the most important exhibits had not arrived or were not ready for exhibition. The papers, with equal fairness, have also stated that the weather as a rule was wretched, fierce gales, an unseasonably low temperature and rain being the rule, while sunshine and balmy breezes were the very rare exceptions. The hotels, boarding-houses, restaurant keepers and those who supply visitors with room accommodations in the vicinity of the Fair grounds have also been described as a lot of extortionists whose sole end and aim was to fleece all who came within their reach. It is not the present purpose either to deny or confirm the charges of rapacity of hotel proprietors and the other classes mentioned, but the fact remains that hundreds who have suffered from what they consider exorbitant charges have reported their grievances to friends at home, and the latter have decided to postpone their visit, believing that such abuses will ere long be in a measure abated. It is therefore safe to assume that the unfavorable circumstances named are keeping ten times as many intending visitors

to the Fair at home as are prevented by the present rates of passenger fares.

The often repeated statement that the chief officers of the railroads are either unfriendly or at least indifferent as to the financial success of the Fair is as absurd as untrue. To begin with every leading railroad company centering in Chicago holds either the bonds or stock issued by the Fair Association, and with scarcely an exception the officers of the roads are individually interested in the same way. It is therefore ridiculous to suppose for a moment that they would adopt a line of procedure which they know would be alike inimical to their own interests there and of the companies they represent. Nor should the fact that the large lines have expended millions of dollars in new rolling stock and other equipment to enable them to handle the business they believe the Fair will attract be overlooked; but they are not inclined to reduce rates to figures that would abolish every vestige of profit from the passenger business. In an interview with the general manager of one of the oldest and best-paying as well as one of the largest lines radiating westward from Chicago, he said: "Granted that visitors have been largely kept away by bad weather and advice to remain at home until all the exhibits are in place, when the great mass of people are ready to come the question of a few dollars in the cost of a ticket on which the price has already been materially reduced, will be a small factor in deterring them as compared with the extravagant charges for rooms, meals and other items of expense for which there is no justification; and if those who express so much solicitude for the financial success of the Fair, and the moral and intellectual benefits the public will derive from an inspection of the display, were sincere in their professions, they would first endeavor to correct the greater abuses named, before wasting so much energy in denouncing the railroad managers because they decline to name nominal rates for passenger fares."

As an evidence that the latter is of small consequence to those now ready to come is the fact that the arrivals the past week were in the proportion of four to one for any equal number of days since the Exposition was formally opened. The railroad officers likewise state that they are advised that if the weather is favorable the current week's arrivals will show a further large increase, and although extra passenger trains have not as yet been required they are likely to be demanded at any moment, as the cars come full, and it is not the intention of the railroad companies that passengers shall be in the least incommoded because of a lack of cars.

**New Enterprises.**—A fortunate feature in connection with the present unsatisfactory condition of monetary affairs is the small amount of new railroad work on hand, and the additional fact that no new lines or branches have recently been built into territory in advance of settlement. Consequently there are few, if any, Western railroad companies that are either cramped for money with which to continue uncompleted work, or handicapped by divisions, which, because of injudicious location, were unable to earn even operating expenses, much less fixed charges, as was the case during financial and commercial disturbances that have occurred within the past two decades. The new track construction on hand is also of a character that will, when completed, materially contribute to the revenue of the companies by whom the tracks are being built; in brief, they will be profitable feeders to the parent lines, and not sappers, as was too often the case with the branches or extensions built in former years.

Among the most important projects now on hand is the extension of the Southwestern Division of the Chicago, Rock Island & Pacific from Bowie to Fort Worth, Tex. The new road will be 70 miles long, and it is expected to be finished and opened for business by July 1. The track is being laid with 70-lb. rails, and the entire work is of a character to sustain the large traffic that the line is sure to derive from the splendid section of the country it traverses. In addition to the advantages of having its own line to Fort Worth, now the most important inland railroad centre in the Southwest, the Rock Island will have a direct and advantageous working traffic with Fort Worth and Galveston lines. The latter city, owing to its favorable location on the Mexican Gulf, has a large and flourishing trade with all the leading countries of Europe. With a view to its favorable location for handling the grain crops of Texas, southern Kansas and Oklahoma, large elevators have been erected, and although it is scarcely known as a grain exporting or even a domestic grain market, it is said to have exported over 2,000,000 bushels of wheat to Europe within the past few months. The new Rock Island extension will also, because of its directness, materially assist in attracting trade this way from Fort Worth and other sections of Texas with which it connects, including a wide section of the cattle raising portion of the state.

D.  
CHICAGO, JUNE 6.

#### TECHNICAL.

##### Manufacturing and Business.

The Moran Flexible Steam Joint Co., of Louisville, Ky., is now making its flexible water joints from steel castings, and after undergoing a hardening process they are rendered more durable than anything the company has yet offered for this work.

The D'Este & Seeley Co., of Boston, manufacturers of the Curtis steam traps, have recently received an order for 40 No. 2 traps, each trap to be supplied with a glass water gauge and automatic air valve. This order is from the McGahan Sugar Refinery, of Philadelphia, and was given to the firm only after a two months' competitive test.

The Sargent Company, formerly the Condon Brake Shoe Company, has established offices in the Monadnock Building, Chicago, Room No. 948. The President, Mr. George M. Sargent, and the General Agent, Mr. Fitz Sargent, will have headquarters there.

The directors of the E. W. Bliss Mfg. Co. met at No. 17 Adams street, Brooklyn, on June 6, and voted to increase its capital stock. Heretofore the capital stock was \$1,275,000, of which \$500,000 was preferred stock. At the meeting it was decided to increase the capital stock to \$2,000,000, of which one-half was to be preferred stock.

At a stockholders meeting of the Dickinson Mfg. Co., held in Scranton, Pa., last week, these directors were re-elected: Samuel Sloan, Percy R. Pyne, W. W. Scranton, W. R. Storrs, William Connell, James P. Dickson, A. H. Vandling, W. W. Manness, James Archibald, Charles S. Westor and E. S. Moffat.

The Northwestern Equipment Co., 1022 Monadnock Building, Chicago, has become the sole lessee for the manufacture and sale of the Hubbard anti-friction side bearings. Over 20,000 of these side bearings are now in use and the price has been reduced from \$10 per set to \$6.50.

The reader will doubtless have noticed in our issue of May 26 an arrangement of the Stow flexible shaft for driving from a portable electric motor. This ingenious and attractive combination has been recently put on the market by the Stow Manufacturing Co., of Binghamton, N. Y.

#### New Stations and Shops.

The Worcester Consolidated Street Railway Co., of Worcester, Mass., has placed the contract for its new carhouse with the Berlin Iron Bridge Co. The new building will be 95 ft. in width and 290 ft. in length, entirely of brick and iron.

The new station of the Pittsburgh, Fort Wayne & Chicago at Beaver Falls, Pa., costing with the grounds about \$25,000, has been opened to the public.

#### THE SCRAP HEAP.

##### Notes.

The report that the Missouri, Kansas & Texas would establish a telephone line between St. Louis, Mo., and Parsons, Kan., is unfounded.

The shops of the Northern Pacific, at Brainerd, Minn., were damaged \$20,000 worth by fire last week. The buildings burned were soon to have been abandoned.

The Philadelphia & Reading has discontinued the running of coal trains on Sunday. According to the press dispatches this is to give the trainmen a much-needed rest. The coal trade is slack at present.

The track of the Chesapeake & Ohio was much damaged by water near Hinton, W. Va., on Tuesday of this week. Press dispatches report two "cloud bursts," and it is said that the loss, including three large trestles, aggregates \$200,000.

The city of Buffalo and the officers of the New York Central & Hudson River Railroad have agreed to abrogate the contract which they made two years ago looking to the abolition of certain important grade crossings in that city, and the city engineer will at once prepare a new plan.

The newspapers have been printing a nice little story of how a dozen young men of Bordentown, N. J., were going to the World's Fair in a freight car fitted up as a lodging room, with cooking stove attachment; but we learn from an officer of the Pennsylvania Railroad that the story is a "fake."

The case of the United States against the Trans-Missouri Freight Association asking for the dissolution of that Association as not lawful, which was decided against the Government by Judge Riner last year, was before the United States Court of Appeals at St. Paul last week, the District Attorney having appealed to that Court.

The Central Vermont road is placing the Gould-Bissell vestibules on all first-class passenger cars not already equipped with vestibules. The Krupp steel wheel is being put on all the passenger cars of the company as they go through the repair shop, and all the cars on the road will soon be equipped with this wheel. At the St. Albans shops a tire turning machine has been set up for turning the tires of worn passenger car wheels. A new boring mill has been ordered and various other improvements are being made at the shops.

Much damage was done in Arkansas and Tennessee on May 31 by a violent wind storm which in most places was accompanied by rain. Near Waldo, Ark., 165 large trees were blown across the track of the St. Louis Southwestern road. The Illinois Central and the Mobile & Ohio had many washouts. The Georgia Pacific was also damaged. The Missouri Pacific was overflown near Arkansas City. On the Louisville & Nashville, near Columbia, Tenn., a passenger train was derailed by a landslide which occurred just as the train was passing. Several trestles were washed away on the Nashville, Florence & Sheffield. The Arkansas & Louisiana Railroad was damaged in many places.



Reports of retrenchment on the Philadelphia & Reading continue to appear in the Philadelphia papers. From 30 to 50 men have been ordered suspended at each of the following points in the mining region: Palo Alto, Tamaqua, Mahony Plane, Gordon, Shamokin, Pine Grove, and Cressona. The men laid off include engineers, firemen, train and roadway hands, clerks, and telegraph operators. It is said that the shops at Palo Alto and Schuylkill Haven will continue to be run on full time. The order of the Pennsylvania to restrict the issue of passes has again been made the subject of a deliverance to the reporters, and it is said that the following circular letter has been issued from the headquarters of the road:

"In furtherance of the policy adopted by the Board of Directors of the Pennsylvania Railroad regarding the curtailing of general expenses and the issuing of free passes and tickets, positive instructions, which go into effect June 1, have been given the heads of the various departments of the company, which will necessitate a reduction in the issue of free transportation to the very lowest limit. Such instruction to these departments of this vast corporation has been made necessary by the very low rates which go into effect June 1, with the adoption of the summer excursion tickets, and primarily by the crowded condition of all trains to and from the World's Fair."

The Wabash has put on a fast passenger train between Toledo and St. Louis, running through in about 12 hours. The westbound train connects with the Exposition Flyer of the Lake Shore, and the time through from New York to St. Louis will be 27½ hours. The Canadian Pacific and the Soo line began last Sunday their new time table under which passenger trains between St. Paul and Boston run 12 hours quicker than heretofore. The new 25-hour train of the Grand Trunk between Montreal and Chicago leaves Montreal at 8:30 p. m. The distance is 837 miles, making the speed 35 miles an hour; the train is, however, quite heavy. The Northern Pacific has shortened the time of one of its through trains 12 hours. The Great Northern announces that it will begin running passenger trains through to the Pacific coast June 18. On the same date the Missouri, Kansas & Texas will put on a vestibule train which, it is said, will run through between San Antonio and Chicago at the rate of 37 miles an hour, including stops. It is announced that the five-hour train between New York and Boston will be put on June 26, leaving each city at 10 a. m. Trains leaving at this hour will reach their destinations 30 minutes ahead of the trains now starting at 9 o'clock, unless the latter are made faster.

#### The Forerunners of the "Campania."

In order to thoroughly appreciate the great development of the steamship, which borders on the marvelous, we have only to make a few figures as to the possibility of propelling a vessel with oars at the calculated speed of the "Campania." If it were possible to place 300 oars on each side, making 600 oars altogether, each worked by three men, there would be 1,800 men at work at one time. As they could not work continuously for 24 hours, but only for a total of eight hours each man, divided into four-hour watches, it would be necessary to have a crew of 5,400 men alone to man the oars. If six men could develop one H. P., the total horse power developed by the 600 oars handled by 1,800 men would be but 300, as against 3,000 in the "Campania," or the same power would require the employment of 180,000 oars and a crew of 553,000 men to manipulate them.

The first steamer built by the Cunard company was the "Britannia," which was launched Feb. 5, 1840, or 53 years ago. She was built of wood, by Robert Duncan, at Port Glasgow, her length being 207 ft.; breadth, 34½ ft.; depth, 22½ ft.; tonnage, 1,156; passengers carried, 115; cargo, 224 tons. The engines, by Robert Napier, were side levers, with two cylinders, 72 in. diam. by 82 in. stroke of piston, driving paddle wheels 28½ ft. diam. Steam of 20 lbs. pressure was provided by four flue boilers, with 12 furnaces, which consumed 38 tons of coal per diem. The speed of the vessel was 8½ knots, with the engine developing 710 I. H. P., coal consumption, over 5 lbs. per I. H. P.; time in making voyage, 14 days.—*Horace See, in The Polytechnic.*

#### A Belt Elevator for Railroad Stations.

At the works of the Jeffrey Manufacturing Co., at Columbus, O., a novelty for railroad stations is in process of construction. It is a moving stairway, and consists of traveling trucks of the proper width for stairs, on an endless chain, and with it is a traveling hand rail that runs at the same rate of speed. Mr. George A. Wheeler, of Chicago, the builder, has four steps constructed, to demonstrate the feasibility of the design. The traveling stairway is intended for underground or elevated railroad stations, the purpose being to put in this apparatus where an elevator would not be desirable. The speed is to be about that of an ordinary walk, and at proper places a landing is formed for the purpose of stepping on or off. The stairway belt is in a state of equilibrium when running, requires no attendant, and involves no waiting, as every passenger is carried as he comes along. All that is necessary is for the passenger to step on and he is quickly landed at the top, while the step continues on its journey. Mr. Wheeler claims that the apparatus will have a capacity for about 6,000 persons an hour. The stairway now being built is to be placed in the Illinois Central station at Chicago before the World's Fair is over, and it will thus be given a severe test.

#### Breaking the News Gently.

The following is said to be a copy of a message sent by an engineman to the foreman of the shops of the Pittsburgh & Western at Foxburg:

"Owing to the temporary deficiency of dampness on the roof of the furnace of locomotive No. 8, the active combustion of carbon caused caloric intensities sufficient to permanently derange the contour of the sheet. Please suspend active participation of this locomotive in transportation department, and require the employment of skilled artisans and mechanical appliances unobtainable at the time and place of such unsolicited and unexpected derangement of crown sheet and schedule. The derangement was caused by procrastination in the application of the appliances for introducing water into the interior of the boiler."

#### The Grant Locomotive Works.

The Grant Locomotive Works made an assignment June 6 in favor of A. K. Ackerman and J. H. Wilson. The liabilities are stated at \$410,950, the assets at \$1,151,464. This result has not been entirely unexpected, as it has been known for some time that the company has been somewhat embarrassed. The immediate cause has been the serious delay in the completion of the heavy contract for 55 locomotives for the Chicago, Burlington & Quincy, due to a strike of the men against the introduction of the piecework system. A large amount of money is tied up in material which cannot be realized on until the contract is completed. Those engines are now nearly ready for delivery, and it is believed that the work will continue, and the company will be shortly relieved from its embarrassment.

#### A Scrap of History.

Mr. J. D. Seguin, who keeps all sorts of clippings, shows his friends in the railroad office a handbill which was issued Jan. 1, 1870. In big, black letters across the top is the announcement, "Lightning time," and then follows the notice that the Louisville line (Louisville & Nashville) had reduced its time to New York to 75 hours. The officers at that time were D. H. Feger, General Southern Agent; W. H. King, General Ticket Agent at New Orleans, and Albert Fink, General Superintendent. Mr. Seguin's father made a memorandum on the paper in 1880, when the time was reduced to 52 hours. To-day the run is made in less than 42 hours.—*New Orleans Picayune.*

#### The Industry of an Iowa Lawyer.

George T. Webster, an attorney of Sioux City, has built up a curious business in collecting accounts from Nebraska railroad men. The laws of Nebraska make such liberal exemptions of wages from garnishment that merchants in that state have difficulty in collecting bills. Under the Iowa laws a non-resident cannot have in Iowa the benefits of another state's exemption laws. Under this law Webster buys up claims against railroad men in Omaha, Lincoln and other Nebraska cities, serves garnishment papers on the Iowa officials of the roads for which the men work and enforces collection under the Iowa laws. Recently he served these notices against 70 Omaha men employed on the Union Pacific, and an investigation proved that he had had about 100 cases a month for six months past. He got judgment by default in all of them, till a resistance was made in a case recently.—*St. Louis Republic.*

#### A Good Run.

The five-hour "Blue Line" Washington train did some fast running Saturday last after leaving Bound Brook. Philadelphia & Reading compound engine No. 619 hauled the train, which consisted of two combination cars, one day coach and one parlor car. The schedule of time made between stations, distances, etc., follow:

TRAIN 511, PHILADELPHIA & READING, June 3, 1893; COMPOUND ENGINE No. 619.

Stations.	Miles.	Time train passed.	Minutes betw'n stations.
Bound Brook.	0	12.24	
Weston.	2.6	12.29	5
Belle Mead.	10	12.34½	5½
Skillman.	14.1	12.37	2½
Hopewell.	17.3	12.46	9
Pennington.	22	12.50	4
Trenton Jct.	27.1	12.54½	4½
Yardley.	29.2	12.57	2½
Woodburne.	33.5	1.01½	4½
Langhorne.	36.1	1.04	2½
Neshaminy.	38.3	1.06	2
Somerton.	41.7	1.09	3
Bethayres.	44.9	1.11	2
Jenkintown.	49.1	1.16	5
Tabor Jct.	52.9	1.20	4
Wayne Jct.	54.9	1.23	3
		Less.....	59
Equals 54.9 miles in.....			6 min.
			53 min.

\*Stopped 6 minutes, brake went on.

#### The Trans-Siberian Railroad.

Gen. N. Gladky, of St. Petersburg, has recently been in this country, on his way from Vladivostok to St. Petersburg. Speaking of the railroad from St. Petersburg to Vladivostok, he says: "There are about 900 versts to be built to Kalarowka alone. From Vladivostok west about 200 versts have already been completed and the cars will be running to Busse on that stretch by the end of June or the middle of July. From Ural in an easterly direction and Irkutsk out track is being laid. Convict labor is used exclusively. On the dock at Vladivostok Japanese and Chinese labor is employed. The dock will be the largest on the coast—600 ft. long and 100 wide. The harbor is being much improved also, and when completed the Russian squadron, instead of wintering at Nagasaki, in Japan, will make Vladivostok its headquarters exclusively."

#### LOCOMOTIVE BUILDING.

Four new class "X" locomotives built at the Altoona shops have just been put in the passenger service on the Pittsburgh Division of the Pennsylvania.

The Rogers Locomotive Works has an order from the Florida Central & Peninsular for five 8-wheel passenger engines and for seven 10-wheel freight locomotives.

The Brooks Locomotive Works, of Dunkirk, N. Y., during the month of May completed 27 locomotives of the following dimensions: Twelve 19 × 26 ten-wheeled engines; nine 18 × 24 ten-wheel; two 16 × 24 eight-wheel; two 18 × 26 consolidation; one 17 × 24 four-wheel switching and one 17 × 24 six-coupled double ender locomotive.

#### CAR BUILDING.

The Buffalo, Rochester & Pittsburgh and the Elmira, Cortland & Northern are in the market for freight cars.

Enough contracts for cars have been made by the Carlisle Manufacturing Co. to keep the men employed for the next six months.

Coxe Bros. & Co. have contracted for 500 gondola cars of 60,000 lbs. capacity. They are being built at a half dozen different shops.

The Receivers for the Harrisburg Car Manufacturing Co. have secured another contract for 50 box cars, but the name of the company is not given.

The Ryan & McDonald Co. will build five oil tank cars, each 35 ft. long, and 25 ft. high, for the Standard Oil Co. They will cost altogether about \$10,000.

An order is being completed at the Columbus shops of the Pennsylvania of 99 special cars for the World's Fair passenger traffic, which are to be converted into coal cars after the Fair closes.

#### BRIDGE BUILDING.

Baltimore, Md.—Bids were opened at the Mayor's office last week for supplying materials for the construction of the stone bridge at North avenue, and also for its erection. The principal bids were from Samuel W. Merritt, whose bid for the material and for erecting the bridge was \$318,591, and McCabe & Bro.'s bid, \$319,000.

Charlottetown, P. E. I.—The Secretary of Public Works is calling for tenders for the building of a new bridge at South Lake, Kings County, according to plans and specifications to be seen at the residence of Daniel J. McDonald, Bothwell, and at the office of the Minister of Public Works.

Columbus, O.—Plans are on foot for the joint construction of a viaduct by the Baltimore & Ohio, the Pennsylvania, the Norfolk & Western and the Cleveland, Akron & Columbus railroads and the Franklin County Commissioners, over the 19 tracks of the roads named, at St. Clair avenue in this city. Joint meetings of the officers have agreed that a viaduct is necessary, but the details remain to be settled. The cost will be from \$100,000 to \$150,000. Seventeen more tracks are being laid at this point, so that the bridge will span 35 tracks.

The County Commissioners have decided to erect bridges in Franklin County as follows: A \$25,000 structure over Big Darby Creek; a \$50,000 structure over Alum Creek on East Broad street; a \$25,000 structure at Westerville over Alum Creek, and a \$10,000 structure known as the Taylor Bridge. The Big Darby bridge is to be two spans of 120 ft. each, the Alum Creek two of 80 ft. each, and the Westerville a single span Pratt truss of 140 ft.

Gettysburg, Pa.—Samuel Stouffer has been given the contract to erect two wooden bridges across the Big Conewago and Rock Creek in this county.

New Bloomfield, Pa.—Neilson & Buchanan, of Chambersburg, Pa., have contracted to build a bridge in Tyrone Township, Perry County, for \$4,900, by next October.

New Brunswick.—The bridge on the Albert Railroad at Turtle Creek, about four miles from Salisbury, was destroyed by fire last week, but it will be rebuilt at once.

Williamsport, Pa.—Viewers have reported favorably on the erection by Tioga and Lycoming counties of a joint bridge, 100 ft. long and 16 ft. wide, over Lycoming Creek on the line dividing the two counties.

Yorktown, Tex.—The County Commissioners' Court last week let the contracts for the construction of two iron bridges, one to be built over the Guadalupe River at Thomas-town to cost \$5,700, the other to be built over Smith's Creek south of Yorktown at a cost of \$3,200, to be completed by Sept. 1, 1893.

#### RAILROAD LAW—NOTES OF DECISIONS.

##### Powers, Liabilities and Regulation of Railroads.

In the Federal Court certain stockholders and directors of a railroad company, who owned a controlling interest therein, having the best interests of the company in view, and with the concurrence of all the other stockholders, negotiated a contract on its behalf with a construction company for the building of a portion of the road for \$10,000 per mile in the bonds, and \$10,000 per mile in the stock, of the railroad company. The Court holds as the contract appeared to be fair, under the circumstances, and involved no fraudulent over-valuation of the work, the bonds and stock issued in accordance with its terms were not void, under the article of the constitution providing that "no corporation shall issue stock except for money, labor done, or money or property actually received, and all fictitious increase of stock or indebtedness shall be void."

In this case the holders of first mortgage bonds of a railroad, having contracted with brokers to sell them all their bonds, transferred to the brokers a portion of the bonds, and together with the brokers fraudulently procured the listing of the bonds in the New York Stock Exchange. The Court holds that persons who loaned money to the brokers on such bonds as security, relying either on the standing and representations of the brokers, or on quotations made in the New York Stock Exchange, and produced by fictitious manipulations of the brokers, and not on the false representations made by the original holders to secure the listing, and who, on non-payment of the loans, were compelled to buy in the bonds held as security, were not, on the ground of fraud, entitled to priority over such original holders in the applications of the proceeds of foreclosure to the satisfaction of the bonds.

In the Federal Court it appeared that the Roanoke Railroad lay entirely in North Carolina and connected on the border of Virginia with the line of the S. & R. The companies were consolidated in 1849, the North Carolina Legislature declaring that the stockholders of the S. & R. were constituted stockholders in the Roanoke with the same rights, powers, privileges and franchises as if they had subscribed an equal amount in the Roanoke. The Court denies that the consolidated company was subject to the burden stipulated for in the charter of the Roanoke and was bound to pay the tax imposed by the legislature of North Carolina on all its shares, irrespective of the proportion of its property lying in that state, or of the citizenship of its stockholders.

The Supreme Court of the state of Washington rules that though under the contract for the construction and equipment of an electric railroad line the construction company agrees to operate the road satisfactorily for 10 days before payment for the equipment, still, where during that time regular passenger cars, manned with the usual help, and on which the public are invited to take passage at the usual fare, are run, the railroad company is responsible for an accident to a passenger occasioned by negligence in the operation of the cars.

In the Federal Court an order appointing a receiver of a railroad company, among other things provided that "all the books, vouchers and papers touching the opera-



tion of the road" should be delivered by its officers, servants and agents to such receivers. The Court holds that the order included all books relating to the previous history of the corporation, and all records of its transactions, and was not confined to books relating to the future operation of the road or to such as the receiver might specifically demand.<sup>5</sup>

The Federal Court rules that a decree of foreclosure and sale of a railroad, entered by consent of the creditors and the company, without fraud, and in pursuance of a plan of reorganization, will not be set aside at the suit of some of the stockholders merely because the principal of one mortgage was not yet due, when the sums due for interest thereon, for floating indebtedness, and on other mortgages then due, were so great as to render foreclosure inevitable, and when complainants do not offer to do equity by paying the floating debt, and have not been diligent in opposing the plan of reorganization, or in attacking the decree complained of.<sup>6</sup>

#### Injuries to Passengers, Employees and Strangers.

In West Virginia the Supreme Court holds that an engineer employed on a railroad yard engine, and a car numberer stationed in the yard to take the number of each car as it arrives, neither of the employees having any control over the other, are fellow servants, and the company is not liable where the car numberer is run over and killed by the locomotive which the engineer is driving.<sup>7</sup>

In Kentucky the Supreme Court of Appeals rules that for a section boss to send a section hand, after a day's labor, to signal passing trains of danger is not such negligence as will sustain a right of action against the company for his death, where it appears that such work was customary for section hands, and that the section hand was willing to do the work, knowing that he would be paid extra therefor.<sup>8</sup>

In Mississippi the Supreme Court holds that where defendant's baggage master, for his own amusement, by threats and menaces, caused a passenger who, through ignorance or carelessness, entered the express car, to jump from the car while in motion, defendant is not liable for the injury resulting therefrom, as such acts of the baggage master were not within the scope of his employment.<sup>9</sup>

In Pennsylvania the plaintiff was wrongfully ejected from defendant's train at a station where she was a stranger, and where there was no regular station-house, on the ground that her ticket was not good on that train. She walked back, a distance of four miles, to the station where she had gotten on the train, and where she must have been to some extent known, and there took a train which she could have taken had she waited at the station where she was put off. She testified that she did not know she could take the train at the latter place. While walking she was caught in a storm and sickness resulted. The Supreme Court holds that the consequences of being caught in the storm were not too remote to enter into the computation of damages.

In the Supreme Court of the United States it is held that for wrongful arrest of a passenger by the conductor, the railroad company is not liable to punitive damages, in addition to such damages as will compensate the passenger for his outlay and injured feelings, merely on the ground that the conductor's illegal conduct was wanton and oppressive, where it is not shown that he was known to the company to be an unsuitable person, or that it participated in, approved, or ratified his treatment of the passenger.<sup>11</sup>

In South Carolina the Supreme Court holds that where a passenger refuses to pay his fare, and assaults the conductor, the conductor has the right of self-defense, and he may meet force with force; and, if he injures the passenger, the jury are not required to nicely weigh the injuries and the conductor is not subject to punishment unless the injuries are greatly disproportioned to the violence offered him and were inflicted wantonly.<sup>12</sup>

In New York the plaintiff, while repairing one of defendant's cars, was injured by the car being run into by defendant's train. The train was in charge of the conductor, who had told plaintiff to get under the car and repair it, and he would let him know when he was going to start out, which he failed to do. When the conductor put the engine on the train he removed the blue flag which was the signal to protect plaintiff while at work. On other occasions he had disregarded the blue flag. There was proof that the conductor had been either extremely negligent or incompetent, of which the officer in charge at the yard had notice. The brake on the car next to plaintiff would not work, and with a good brake the car could be stopped in about eight feet, which might have saved plaintiff, and this broken brake had been in plain sight in the yard for two or three days. The Supreme Court rules that plaintiff could recover.<sup>13</sup>

In Pennsylvania the railroad used two side tracks belonging to the steel company by which plaintiff was employed; one for the purpose of bringing in cars to be used by the steel company, and the other for taking them away when loaded. Between the receipt and delivery of the cars they were under the exclusive control of the steel company, and were shifted about by its employees by means of its own engine. Plaintiff was a brakeman on this engine, and while coupling a car preparatory to shifting it was injured by some cars colliding with it, which defendant had pushed in on the side track. The Supreme Court holds, that plaintiff was neither an employee of defendant railroad company nor doing work which made him a quasi employee of such company, and his recovery was not barred by the statute, providing that an employee of a railroad company cannot recover for an injury caused by the negligence of a fellow servant.<sup>14</sup>

In Iowa the Supreme Court holds that a railroad employee whose business is to remove the ashes, cinders, and fire from locomotives, to supply them with water and sand, and to aid in moving engine tanks, in the railroad yard, is engaged in work connected with the operation of a railroad, within the statute which makes railroad companies liable for injuries received by their employees in consequence of willful wrongs of their agents, "where such wrongs are in any manner connected with the use and operation of any railroad."<sup>15</sup>

In Texas it is held that where a car inspector negligently fails to discover that a foreign car running on the road is in bad order, and to report it for repairs, the company is liable for injuries to a brakeman caused by the defect.<sup>16</sup>

In Pennsylvania it is held that an assistant foreman is a fellow servant of a workman who works with him;<sup>17</sup> in Texas that a car inspector is not a fellow servant of a brakeman;<sup>18</sup> and in Connecticut a foreman whose duty it is to prepare dynamite cartridges for blasting, and to direct the work of certain laborers, though not to hire or discharge, is a fellow servant of such laborers.<sup>19</sup>

In Texas it is laid down by the Supreme Court that when a railroad bridge is not properly constructed and maintained and injuries result to employees, the railroad

company will not be excused from liability because of negligence of employees, to whom it delegated those duties, even if due care was used in selecting such employees.<sup>20</sup>

In Missouri it is held that the mere fact of a collision does not establish a presumption of negligence on the part of a railroad company in favor of its employees, such a presumption existing only in favor of passengers.<sup>21</sup>

In West Virginia it appeared that the plaintiff's team of horses were frightened by the train and ran down the public road and into the cab of defendant's engine; that plaintiff and his driver were both drunk, and that plaintiff knew that the train was approaching. The Supreme Court holds that the fright of the horses and the inability of plaintiff and his driver to control them because of intoxication was the proximate cause of the accident, and not the failure of the statutory signal.<sup>22</sup>

In Pennsylvania it is laid down that it is negligence for an electric street car company to run a car along a narrow and unlighted alley, on a dark night, so fast that it cannot be stopped within the distance covered by its own headlight.<sup>23</sup>

In a case in New York it was held that a railroad is guilty of negligence in laying its tracks so close together that trains cannot pass each other safely in rounding a curve; and a brakeman who, while endeavoring to force an intoxicated passenger off a car step and into the car, is knocked off the step by a train moving in the opposite direction rounding the same curve, may recover from the company for his injuries.<sup>24</sup>

- <sup>1</sup> *See* *East & W. R. Co. of Alabama*, 52 Fed. Rep., 531.
- <sup>2</sup> *Coe v. East & W. R. Co. of Alabama*, 52 Fed. Rep., 531.
- <sup>3</sup> *State v. Seaboard & R.*, 52 Fed. Rep., 456.
- <sup>4</sup> *Cogswell v. West St. & N. E. Elec. Ry.*, 31 Pac. Rep., 411.
- <sup>5</sup> *Am. Const. Co. v. J. T. & K. W.*, 52 Fed. Rep., 937.
- <sup>6</sup> *Carey v. H. & T. C.*, 52 Fed. Rep., 671.
- <sup>7</sup> *Beuhring v. C. & O.*, 16 S. E. Rep., 435.
- <sup>8</sup> *Wadlington v. N. N. & M. V.*, 20 S. W. Rep., 783.
- <sup>9</sup> *Malone vs. Pitts & L. E.*, 25 Atl. Rep., 638.
- <sup>10</sup> *L. S. & M. S. v. Prentiss*, 13 S. Ct. 261.
- <sup>11</sup> *Moore v. C. & G.*, 16 S. E. Rep., 781.
- <sup>12</sup> *Sutton v. N. Y. I. E. & W.*, 21 N. Y. S., 312.
- <sup>13</sup> *Spilak v. R. & O.*, 25 Atl. Rep., 497.
- <sup>14</sup> *Butler v. C. B. & Q.*, 51 N. W. Rep., 208.
- <sup>15</sup> *St. L. A. & T. v. Putnam*, 20 S. W. Rep., 1002.
- <sup>16</sup> *McGinley v. Levering*, 25 Atl. Rep., 821.
- <sup>17</sup> *St. L. A. & T. v. Putnam*, 20 S. W. Rep., 1002.
- <sup>18</sup> *Sullivan v. N. Y., N. H. & H.*, 25 Atl. Rep., 711.
- <sup>19</sup> *G. H. & S. A. v. Daniels*, 20 S. W. Rep., 955.
- <sup>20</sup> *Smith v. M. Pac.*, 20 S. W. Rep., 399.
- <sup>21</sup> *Butcher v. W. V. & P.*, 16 S. E. Rep., 457.
- <sup>22</sup> *Gilmore v. F. St. & P. V. Pass. Ry. Co.*, 25 Atl. Rep., 651.
- <sup>23</sup> *Mulvaney v. Brooklyn City R. Co.*, 21 N. Y. S., 427.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

*Albany & Susquehanna*, semi-annual, 3½ per cent., payable July 1.

*Boston & Lowell*, semi-annual, 3½ per cent., payable July 1.

*Chicago & Northwestern*, 1½ per cent. on the preferred, and 3 per cent. on the common stock, payable June 28.

*Chicago, St. Paul, Minneapolis & Omaha*, semi-annual, 3½ per cent. on the preferred stock, payable July 20.

*Delaware & Hudson Canal*, quarterly, 1½ per cent., payable June 15.

*Eastern of New Hampshire*, semi-annual, 1½ per cent., payable June 15.

*Little Miami*, quarterly, 2 per cent., payable June 10.

*New York Central & Hudson River*, quarterly, 1½ per cent.

*Philadelphia, Wilmington & Baltimore*, semi-annual, 3½ per cent., payable July 1.

*Rensselaer & Saratoga*, semi-annual, 4 per cent., payable July 1.

*United New Jersey R. R. & Canal Co.*, quarterly, 2½ per cent., payable July 10.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Chesapeake & Ohio Southwestern*, special, Memphis, Tenn., June 13, to approve of the purchase of the Hodgenville & Elizabethtown.

*Oregon Railway & Navigation Co.*, annual, Portland, Ore., June 19.

*Peoria, Decatur & Evansville*, special, Peoria, Ill., June 30.

*Pontiac Pacific Junction*, special, 162 St. James street, Montreal, Que., June 17.

*St. Joseph & Grand Island*, annual, Elwood, Kan., June 13.

##### Technical Meetings

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *International Association of Car Accountants* will hold its next annual convention at Indianapolis, June 19.

The *Master Car Builders' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 13. Applications for rooms should be made to J. B. Brady, Kent House, Lakewood, N. Y.

The *Master Mechanics' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 19.

The *Train Dispatchers' Association of America* will hold its annual convention in Salt Lake City, Utah, June 20.

The *World's Railway Commerce Congress* in connection with the World's Fair at Chicago will hold a meeting at Chicago, June 19.

The *Association of Railway Telegraph Superintendents* will hold a meeting at Milwaukee, Wis., June 20.

The *New England Water-Works Association* will hold its twelfth annual convention at Worcester, Mass., June 14, 15 and 16.

The *Association of Railway Claim Agents* will hold its annual meeting in the Rookery Building, Chicago, July 11.

The *Western Railway Club* meets in room 730, The Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m. The May meeting has been postponed to June.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-ninth street, New York, on the first and third Wednesdays in each month.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m. The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The *Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of June, at 2.30 p. m.

#### American Society of Civil Engineers.

At the meeting held Wednesday evening, June 7, W. H. Jacques, M. Am. Soc. C. E., Ordnance Engineer at the Bethlehem Iron Works, read a paper, illustrated by a number of stereoscopic views, on "The Manufacture of High-Power Ordnance, with Special Reference to the Wire-Wrapped Gun."

The Secretary announced that the paper to be presented at the meeting of June 21, the last meeting of the season, would be on "The Erosion of the banks of the Mississippi and Missouri Rivers," by J. A. Ockerson, United States Assistant Engineer of the Mississippi River Commission.

The following persons were elected: As Members, Albert Safford Cheever, Fitchburg, Mass.; Richard Evans, Jamaica, N. Y.; Theodore G. Hoeck, Washington, D. C.; George H. Hutchison, Pittsburgh, Pa.; Walter McCulloch, Brewster, N. Y.; Elwood Mead, Cheyenne, Wyo.; Christian P. E. Swenson, Pittsburgh, Pa.; Robert A. Way, London, England; Emanuel A. Ziffer, Vienna, Austria. As Associate Members: William F. Behrens, Albuquerque, N. M.; Charles R. Bettes, Hoboken, N. J.; Robert K. Brown, Jr., Pittsburgh, Pa.; Arthur P. Davis, Los Angeles, Cal.; A. P. Folwell, Atlantic Highlands, N. J.; Arsene Perrillat, New Orleans, La.; Gerdt H. Vedeler, New York City. As Junior: Harry T. Cory, Ithaca, N. Y.; Ernest C. Moore, Purdy's Station, N. Y.; Joe Emery Sirrine, Greenville, S. C.

#### Association of American Railway Accounting Officers.

The annual meeting of this association was held at the Auditorium hotel in Chicago, May 31, D. A. Waterman, of the Michigan Central presiding. There were 250 members in attendance.

On recommendation of the freight committee it was agreed to recommend that all railroads be urged to have the original car number and point of shipment shown on all way bills. The convention approved of the recommendation of the passenger committee that interstate tickets exchanged for prepaid orders be reported, with value, in the month in which they are issued.

In reply to an inquiry Mr. Riebenack, of the Pennsylvania, stated that he destroyed tickets by cutting. Where the quantity is too small to warrant the purchase of cutting machinery, burning is the best method. From a letter ballot, as to which department should settle freight claims, it appeared that on 32 per cent. of the mileage reporting, the Accounting Department made settlements of overcharge claims and on 66 per cent. the work was done by the Freight Department. With loss and damage claims it is a little different, the reports showing that on 21 per cent. of the mileage the matter was in the hands of the Accounting Department and on 60 per cent. in the hands of the Freight Department. The opinions of the officers reporting were largely in favor of putting the business wholly in the hands of the Accounting Department, but a resolution to that effect was voted down, it being deemed advisable to have the Executive Committee consider the matter further.

The following officers were elected for the ensuing year: President, C. P. Leland, Lake Shore & Michigan Southern; Vice-Presidents, G. L. Lansing, George M. Taylor, Secretary C. G. Phillips was re-elected, and Messrs. Robinson, Winnie, Kochersperger, and Jollett were elected as additional members of the Executive Committee.

#### Instruction in Air-Brake Practice.

Secretary W. O. Thompson, of the Traveling Engineer's Association, has sent out a circular prepared by the committee on "The Instruction of Men in the Safe and Practical Handling of Air Brakes in all Kinds of Service," asking replies to the following questions:



1. Do your engineers pass any examination on their ability to handle the air brake on all classes of trains? 2. How is this examination conducted, and who examines them? 3. Are any other employes examined on this subject? If so, who are they? 4. Have you an instruction car, or any appliances to aid the men in explaining or improving themselves as to the operation of the air brakes? Please give detailed description of the instruction car or room, with blueprints or diagrams of arrangements of interior. 5. Do you think it possible to instruct promoted or newly employed men in the safe handling of the air brakes without the use of an instruction car, or some appliances except the engines and cars as we find them in actual service?

In connection with the answers give your opinion relating to the instruction of all classes of engine and train men in the use of the air brake. Please give the committee all the information you may have on this matter, without confining yourself to the questions asked. All replies should come in not later than July 15, to give the committee time to prepare their report.

The committee are: J. E. Goodman, Chairman, Northern Pacific, Brainerd, Minn.; M. M. Dodd, Seaboard Air Line; Geo. Holmes, Norfolk & Western; J. W. Shannon, Westinghouse A. B. Co.; A. B. Burdett, New York Air Brake Co.

#### International Association of Car Accountants.

The programme for the annual convention at Indianapolis, June 19 and 20, has been issued. On Monday, June 19, there will be sessions at 9:30 a. m. and 2:30 and 8 p. m. On Wednesday there will be business sessions at 9 a. m. and 2 p. m.; at 7:30 p. m. a reception at Hotel Denison, at 8:30 p. m. a ball and at 10:30 p. m. a dinner.

All entertainments will be furnished by the railroads, fast freight lines and private car companies. After the close of the morning session, Tuesday, there will be an excursion on the electric road. All meetings will be held in the Board of Trade rooms. A special train to Chicago is to be decided upon later. Delegates are especially requested to secure all their transportation for the trip, before leaving home, through the proper channel. Regular transportation will be necessary on the special train to Chicago. The Pullman Company will issue passes going to Indianapolis, full fare to be paid returning. The Wagner Company will issue passes for return trip on presentation of receipts for fare paid going to Indianapolis. Applications for rooms must be addressed to T. J. Cullen, proprietor Hotel Denison, Indianapolis. All are outside rooms. The rate is \$3 a day. J. R. Cavanagh, H. G. Sleight and W. A. Wildhack are the Committee on Arrangements.

#### National Association of Railway Surgeons.

The National Association of Railway Surgeons met in Omaha, May 31 and June 1 and 2, about 600 members being present. Hon. J. M. Thurston, General Solicitor of the Union Pacific, delivered the address of welcome. The election of officers resulted as follows: President, Dr. W. G. Galbraith; Secretary, Dr. J. M. Dinton; Treasurer, Dr. Harvey Reed. Galveston, Tex., was fixed upon as the next place of meeting, the date to be selected by the Executive Committee.

#### Southern & Southwestern Railway Club.

The regular meetings of the Club have been adjourned over the summer, and the next meeting is announced for Sept. 21 at the Kimball House, Atlanta, Ga. Several committees have been appointed to prepare reports for this meeting.

#### Western Railway Club.

The Club met June 6 at the Grand Pacific Hotel and received and discussed the report on the tests of couplers, which is published on another page. The discussion was by Messrs. Watt, McKenzie and Rhodes. Many coupler men were present, and there was general agreement that much valuable information had been brought out by the tests.

#### PERSONAL.

—Mr. W. R. Groseclose, General Freight Agent of the St. Louis Southwestern of Texas, with headquarters at Tyler, Tex., has resigned to accept service with another road.

—Mr. William Hale, President of the Dover & Winnipicogee Railroad, died last week in Dover, N. H., where he was born in 1809. He was the projector of other short roads in New Hampshire.

—Mr. H. C. Landon, Assistant Engineer on the Delaware Division of the New York, Lake Erie & Western, with headquarters at Port Jervis, has accepted the appointment of a similar position under the State Engineer on the state canals of New York, and will be located at Little Falls.

—Mr. R. H. Innis, at present Division Superintendent of the Southern Pacific, in Texas, has been appointed Superintendent of Transportation of the San Antonio & Aransas Pass road. He succeeds Mr. F. E. Nelson, who, it is understood, has accepted a position on the Gulf, Colorado & Santa Fe.

—Col. A. W. Dickinson has resigned the position of General Superintendent of the Missouri Pacific system on account of ill health. Mr. Horace G. Clark, Superintendent of the St. Louis Division of the Missouri Pacific, has been appointed as his successor. Colonel Dickinson has held the position from which he has just resigned over 21 years and has been identified with the road from almost its beginning. Mr. Clark, who will succeed him, has been with the Missouri Pacific a number of years.

—Rev. Ralph Swinburg, of Charleston, W. Va., is mentioned by the *Wheeling Register* as probably one of the oldest railroad men now living. Mr. Swinburg was born at Newcastle-on-Tyne, England, Aug. 4, 1805, and worked on a coal tramway when 13 years old. He was early associated with George Stephenson and laid part of the track of the Stockton & Darlington road. He was later Superintendent of the Bolton & Leeds road. He came to this country in 1830 and has been a minister of the Baptist Church since 1856.

—Mr. Adolphus Bonzano, Vice-President and Chief Engineer of the Phoenix Bridge Company, resigned his connection with the company on June 1, after having been its virtual head for more than 25 years. Mr. John Sterling Deans, heretofore Principal Assistant Engineer, has been appointed Chief Engineer of the Phoenix Bridge Company.

Mr. Bonzano will be associated with Mr. Thomas C. Clarke, of New York City, in conducting a business as general designers and builders of steel and iron structures and deep foundation work. They will also act as

associate engineers with the Union Bridge Company and Sooy-Smith & Co., of New York, and will have offices at 44 Broadway, New York, and Phoenixville, Pa.

Adolphus Bonzano was born Dec. 5, 1830, at Ehingen, Kingdom of Wurtemberg, Germany. He received a classical and polytechnical education at the schools of Stuttgart, and came to America at the age of 20. After spending a winter in Philadelphia, studying the language and customs of this country, he went to Springfield, Mass., in May, 1851, where he entered the American Machine Works, serving there an apprenticeship as a machinist and draughtsman for four years. In 1855 he was sent to New Orleans to take charge of the erection of the engines and other machinery built at the Springfield works for the United States Mint. On completion of that work he went to Detroit, Mich., where he was engaged till 1860 as Superintendent of the machine shop of the Detroit Dry Dock Iron Works. When this concern was transformed into the Detroit Bridge and Iron Works, Mr. Bonzano was put in charge as Superintendent of Bridge Construction. Among other important bridges built under his charge at that time was the great bridge over the Mississippi River at Quincy, Ill., Mr. Thos. C. Clarke being the Consulting Engineer for that bridge. At that time the first ties were formed that were to result in a life-long friendship between Mr. Bonzano and Mr. Clarke and that first took a practical shape in the formation of the bridge building firm of Kellogg, Clarke & Co., of which Mr. Bonzano was a prominent member and the Chief Engineer. This was in the year 1863, the firm being located in Phoenixville, Pa., and forming an intimate connection with the Phoenix Iron Works, which manufactured the material for the bridges contracted for and designed by Kellogg, Clarke & Co. This firm was succeeded in the following year by that of Clarke, Reeves & Co., Mr. Kellogg retiring, and the connection with the Phoenix Iron Co. becoming still closer. In the 15 years of its existence, with Mr. Bonzano as the leading constructor and engineer, this firm gained a reputation second to no other similar concern in the world by the immense number of iron bridges, viaducts and roofs, including such structures as the Hudson River bridge, at Albany, of the New York Central; all the bridges for the Intercolonial Railway for the British North American colonies; the famous Girard Avenue bridge in Philadelphia, perhaps the finest highway bridge in the world; the bridges for the North Shore Railway, now an important link of the Canadian Pacific; the Second, Sixth, Eighth and Ninth Avenue lines of the Manhattan Elevated Railways of New York; the famous Kinzua Viaduct, at the time of its construction the highest in the world, which for boldness of conception by its designer and masterly execution astonished railroad and engineering circles all over the world; and many other structures scarcely less important.

In 1884 the firm of Clarke, Reeves & Co. was dissolved and succeeded by a stock company under the name of the Phoenix Bridge Co., with Mr. Bonzano as its virtual head as Vice-President and Chief Engineer. We need only mention among the works executed by this company the great bridge for the Chesapeake & Ohio over the Ohio at Cincinnati, with its three long spans, the central one of 550 ft., and its extensive approaches, all provided with double track, two roadways and two sidewalks; the Pecos River Viaduct on the Southern Pacific Co.'s system, a structure which surpasses in boldness even the Kinzua Viaduct, reaching the enormous height of 320 ft.; the Red Rock Cantilever Bridge on the line of the Atlantic & Pacific which spans the canyon of the Colorado River with a central span of 660 ft. and two anchorage spans of 165 ft. each, a total length of 990 ft. between abutments; the new trainshed for the Terminal Station at Philadelphia, of the Philadelphia & Reading, with a span of 266 ft., excelled in length of span only by the trainshed now being erected in the same city by the Pennsylvania Railroad. These examples are sufficient to entitle Mr. Bonzano to rank with the great designers and constructors of the age as a man of talent.

Mr. Bonzano, besides being a member of the American Society of Civil Engineers, also belongs to the American Society of Mechanical Engineers and to the American Society of Mining Engineers. He is a genial man, popular in engineering and railroad circles, and no one is more beloved and appreciated by his employes, as was evidenced quite recently on the occasion of the twenty-fifth anniversary of his connection with the Phoenix Bridge Co., when the whole staff of the office united to give him a testimonial of their love and appreciation. One of the finest traits of his character is his benevolence. Fortune has favored him, and he has shown himself worthy of such favor by dispensing his charity openhanded to the poor and needy of his town.

#### ELECTIONS AND APPOINTMENTS.

**Arkansas & Louisiana.**—George E. Dodge has been elected President of this company, with office at Little Rock, Ark., vice Thomas Essex.

**Atlantic Coast Line.**—E. Borden has been appointed Superintendent of Transportation of all the roads comprising this system, with headquarters at Wilmington, N. C. J. A. Fountain has been appointed Assistant Superintendent of the Richmond Division.

**Atlanta & Florida.**—General Manager T. W. Garrett announces, under date of Atlanta, Ga., May 30, that, having assumed control of this property for the purchasers, the following appointments have been made: W. E. Algee, Treasurer and Auditor; H. M. Cottingham, General Freight and Passenger Agent, and H. L. Collier, Engineer Maintenance of Way.

**Augusta & Knoxville.**—John B. Cleveland was appointed Receiver last week by the United States District Judge Simonton, at Charleston, S. C.

**Boston & Maine.**—At the meeting of the directors of the company in Boston, June 3, the resignation of A. A. McLeod as a director was tendered and accepted. The directors adjourned without electing a President to succeed Mr. McLeod, as there was not a full meeting of the board.

**Bristol, Elizabethton & North Carolina.**—F. W. Tabrum has been appointed Chief Engineer, vice G. S. Bruce, with office at Bristol, Tenn.

**Buffalo Central.**—F. H. Thomas has been appointed Superintendent of this road, vice Thos. A. Shoemaker, resigned.

**Burlington, Cedar Rapids & Northern.**—The following appointments were announced last week: Robert Williams, Vice-President and Superintendent, has been appointed General Superintendent of the entire

system; George A. Goodell, formerly Superintendent of the Iowa Falls Division, appointed Superintendent of the main line and all branches, with the exception of the Second, Third and Fourth, Iowa Falls and Forest City divisions, of which W. H. Ward has been appointed Superintendent; S. Spafford succeeds W. H. Ward as Superintendent of Telegraph.

**Canada Atlantic.**—The following directors have been elected: C. J. Booth (President), G. H. Perley, E. C. Smith, J. F. Booth, W. Anderson, N. Mackintosh and J. A. Seyd.

**Charleston, Sumter & Northern.**—J. H. Averill, formerly General Manager of this road, having resigned to become Receiver of the Port Royal & Augusta, the duties previously performed by the General Manager have been assumed by Curtis Millard, Superintendent.

**Chicago, Fort Madison & Des Moines.**—John C. MacKinnon has been appointed General Manager, with headquarters at Fort Madison, Ia.

**Chicago, Milwaukee & St. Paul.**—The annual meeting was held at Hudson, Wis., June 3.

The following officers and directors were chosen: Marvin Hughitt, President; Martin L. Sykes, Vice-President, Treasurer and Assistant Secretary; Edwin E. Woodman, Secretary. Directors for three years: Marvin Hughitt, Chicago; David P. Kimball, Boston; Edwin W. Winter, St. Paul; Byron L. Smith, Chicago; Chauncey M. Depew, New York. For one year, Thomas Wilson, St. Paul.

**Chicago & Northwestern.**—Lloyd W. Bowers, of the law firm of Wilson & Bowers, of Winona, Minn., has received the appointment of General Counsel of the system, to succeed the late Mr. Goudy, with headquarters at Chicago.

**Chicago, St. Paul, Minneapolis & Omaha.**—At the annual election at Hudson, Wis., the following directors were elected: Marvin Hughitt, David P. Kimball, E. W. Winter, Byron L. Smith and Chauncey M. Depew for three years, and Thomas Wilson for one year, in place of Hon. James H. Howe, deceased. The following officers were elected: President, Marvin Hughitt; Vice-President and Treasurer, M. L. Sykes; Secretary, E. E. Woodman.

**Cleveland, Akron & Columbus.**—H. P. Taylor, formerly Chief Clerk, has been promoted to the position of Auditor and Assistant Treasurer of the road, vice A. W. Dunning, resigned to accept a position in the management of the road.

B. H. Akin, who has been City Passenger and Ticket Agent at Columbus, O., has been appointed Division Passenger Agent, a new office just created.

**Cleveland, Lorain & Wheeling.**—James Graham, a Michigan Central Engineer, has been appointed Master Mechanic of this road, with office at Lorain, O.

**Colorado Midland.**—C. E. Rittenhouse, Assistant Superintendent at Colorado City, has been made Chief Clerk to Superintendent Bryant, the former office being abolished. R. C. Bowditch, the Assistant Superintendent at Leadville, Col., has been given jurisdiction over the entire road.

**Duluth, Missabe & Northern.**—The Legal Department of this company has been organized as follows: Charles W. Wetmore, of New York, has been elected General Counsel, and Herbert L. Satterlee, of New York, and Joseph B. Cotton, of Duluth, have been appointed attorneys of the company. The office of the company is at Lyceum Building, Duluth.

**Duluth, South Shore & Atlantic.**—At the annual meeting on June 1 the following directors were elected: Gen. Samuel Thomas, of New York; Senator Calvin S. Brice, of Ohio; Lord Mount Stephen, Sir Donald A. Smith, W. C. Van Horne and T. M. Shaughnessy, of the Canadian Pacific, Montreal; John W. Sterling, Walter Watson, Thomas W. Pearsall and George H. Church, of New York; General Manager W. F. Fitch, of Marquette, Mich.

**Elgin, Joliet & Eastern.**—George O. Clinton, who has been Superintendent of the road for over five years, resigned last week. C. H. Ackert, formerly of the Iowa Central, is now General Manager of the road.

**Fonda, Johnstown & Gloversville.**—James Shanahan has been elected President in place of H. Walter Webb, who sold his stock in the road last week. The new Directors of the company are James S. Burr, A. J. Zimmer, S. H. Shotwell, G. Levor, and George M. Place, of Gloversville, N. Y.; James P. Argersinger, John G. Ferris, Johnstown, N. Y.; J. Leslie Hees, Fonda; Thomas F. Kyne, Amsterdam; James Shanahan, Tribe's Hill, N. Y.

**Fort Worth & Rio Grande.**—A. A. Miller having resigned, H. P. Johnson has been appointed Superintendent of Transportation, with office at Fort Worth, Tex., to take effect June 1.

**Houston, East & West Texas.**—Thomas Cronin, General Roadmaster of the International & Great Northern, has been appointed General Superintendent of this road, which has recently been taken out of the control of the Receiver.

**Indianapolis, Decatur & Western.**—A. P. Lewis has been appointed Auditor of this company, with headquarters at Indianapolis, Ind., vice J. V. McNeal, resigned to take service with another company.

**Kickapoo Valley & Northern.**—The annual meeting of the stockholders was held at Boscobel, Wis., May 26. The following directors were chosen: E. I. Kidd, B. L. Washburn, W. S. Manning, Ole Dale, J. O. Davidson, Atley Peterson and W. H. Bennett, who elected the following officers: E. I. Kidd, President; J. O. Davidson, Vice-President; W. S. Manning, Secretary; Atley Peterson, Treasurer.

**Memphis & Charleston.**—A. H. Plant has been appointed Auditor for the Receivers of this company, in place of D. T. Flippin, resigned.

**Mexican Central.**—At a meeting of the directors of the company this week these officers were elected: A. A. Robinson, President; R. R. Simon, Vice-President, London, England; S. W. Reynolds, Vice-President and Treasurer, Boston, in charge of the financial department; Edward W. Jackson, Vice-President and General Manager, City of Mexico, in charge of the operation of the road.

**Minneapolis, St. Paul & Sault Ste. Marie.**—The annual meeting of the stockholders of the company was held on June 7. The old Board of Directors, consisting of Thomas Lowry, W. D. Washburne, John Martin, R.



**B. Langdon, C. H. Pettit, J. S. Pillsbury and W. C. Van Horne** were re-elected without opposition.

**Minnesota & Wisconsin.**—F. H. Britton has been appointed General Superintendent of this road, with headquarters at Spring Valley, Wis.

**Missouri, Kansas & Texas.**—The office of Resident Engineer of the Texas lines has been abolished, and the work will hereafter be in charge of a General Roadmaster. A. M. Acheson remains as Assistant Engineer, and has charge of the work from Denison to Henrietta, Denison to Dallas, Denison to Mineola and Denison to Sherman. L. D. Cornelius has charge of the balance of the road, with headquarters at Waco, Tex.

**Missouri Pacific.**—Horace G. Clark has been appointed General Superintendent to succeed Col. A. W. Dickinson, whose resignation was announced last week. L. D. Hopkins, Division Superintendent at St. Louis, has been appointed as Mr. Clark's successor as Superintendent at Sedalia, and W. G. Brownlee, chief train dispatcher in St. Louis, has been made Division Superintendent of the St. Louis division in charge of the lines between St. Louis and Sedalia.

**New Boston.**—The annual meeting of the company was held last week, and the following directors elected: G. A. Wason, of New Boston, N. H.; J. Reed Whipple, of Boston; Frederick Smyth, Walter M. Parker, of Manchester; B. A. Kimball, J. H. Pearson, of Concord, N. H.; C. A. Busiel, of Laconia. The board organized with Mr. Wason, President; J. Frank Webster, of Concord, Treasurer, and E. H. Wason, of Nashua, Clerk.

**Newport News & Mississippi Valley Co.**—S. R. Tugle has been appointed Superintendent of Motive Power with headquarters at Paducah, Ky., vice William Hassman, resigned.

**New York & New England.**—At the meeting of the directors of the railroad, June 1, Charles A. Prince resigned as a director and Marsden J. Perry, of Providence, R. I., was chosen in his stead. Moorfield Storey was elected general counsel of the company.

**New York & New Jersey Bridge Co.**—The stockholders elected the following directors at a meeting at 214 Broadway, New York City, on June 6: John B. Kerr, Vice-President, New York, Ontario & Western Railroad; Louis Windmuller, James T. Woodward, Frederick Potter, William Bell, William H. Ely, W. F. Dunning and John H. Wissner, all of New York; John Loughran and Charles H. Swan, Brooklyn; Daniel N. Lockwood, Buffalo, N. Y.; Willard H. Mase, Matteawan, N. Y.; John C. Adams, Newburg, N. Y.

**Ottawa & Parry Sound.**—The following directors have been elected: J. R. C. McLachlin, C. Mohr, J. Booth, C. J. Booth, W. Anderson and N. Mackintosh.

**Pacific Mail Steamship Co.**—C. P. Huntington was this week elected President of the company, to succeed George J. Gould; and R. P. Schwerin, of San Francisco, was chosen Vice-President and General Manager, in place of J. B. Houston, who has resigned. Mr. Houston at the same time withdrew from the Board of Directors. No other changes were made at the meeting.

**Paducah, Tennessee & Alabama.**—Benjamin Wilson, General Manager of the Paducah, Tennessee & Alabama, and the Tennessee Midland, has resigned. It is understood the office of General Manager will be abolished and the duties will be performed by Superintendent W. J. Hills.

**Pennsylvania Company.**—The annual meeting of the stockholders was held at Pittsburgh, June 6. The following Board of Directors was elected: George B. Roberts, James McCrea, J. T. Brooks, Thomas D. Messler, John E. Davidson, H. H. Houston, Frank Thomson, Henry D. Welsh, John P. Green, W. H. Barnes, Amos R. Little, N. P. Shortridge and Charles E. Pugh.

**Philadelphia & Reading.**—General Superintendent Sweigard has appointed C. M. Lawlor Superintendent of the Atlantic City Division, vice G. D. Whitcomb, assigned to other duties. The jurisdiction of A. M. Wilson, Superintendent of the Reading & Columbia Division, has been extended to cover the lines forming the Harrisburg & Pittsburgh Division, which will hereafter be incorporated with the Reading & Columbia Division. The jurisdiction of B. F. Bertolet, Superintendent of the Shamokin Division, is extended to include the lines of the Catawissa Division. The offices of Superintendent of the Harrisburg & Pittsburgh Division and Superintendent of the Catawissa Division are discontinued. The operation of the Pennsylvania, Poughkeepsie & Boston road will be under the charge of the General Superintendent of the Eastern Division. The jurisdiction of James Donnelly, Superintendent of the Lehigh Division, is extended over the Catawissa & Fogelsville road and the Pennsylvania, Poughkeepsie & Boston Railroad.

**Queen & Crescent.**—General Freight Agent H. T. Smith has appointed the following assistants to take effect from June 1: I. Hardy, Assistant General Freight Agent, Vicksburg, Miss.; G. P. Biles, Assistant General Freight Agent, Cincinnati, O.; T. C. Powell, Assistant General Freight Agent, Cincinnati, O.

**San Antonio & Aransas Pass.**—The Board of Directors of the railroad have accepted the resignation of Uriah Lott, the former president of the company, of New York, as director, and William Berry has been elected to fill the vacancy. Thomas Palfrey was elected a director to succeed C. D. Dorman, resigned; R. H. Innes to succeed William Huermann, resigned, and William Mahle, to succeed A. C. Schryver, resigned.

Mr. C. D. Dorman having resigned, J. W. Terry has been appointed Auditor, with headquarters at San Antonio, Tex. The office of Paymaster of this company has been abolished; hereafter all communications pertaining to that office will be addressed to the Treasurer, W. H. Field, at San Antonio.

**Seaboard Air Line.**—J. B. Martin has been appointed General Auditor of this system, with headquarters at Portsmouth, Va.

**Southern Pacific.**—D. T. Forbes, chief train dispatcher between San Antonio and Sanderson, Tex., has been appointed Superintendent of the San Antonio division, to succeed R. H. Ennis, who becomes Superintendent of Transportation on the San Antonio & Aransas Pass road.

**Suffolk & Carolina.**—William T. Hunter, General Manager of this company, has resigned to accept position with another company.

**Terre Haute & Peoria.**—The extension of the jurisdiction of the general officers of the Vandalia system

or over the Terre Haute & Peoria Division, took effect June 1. Assistant General Manager Hill will have practical management, and General Freight Agent Hibbard will have charge of the freight traffic. J. Fitzpatrick, Commercial Agent of the road at Peoria, and J. H. Sessions, who was Superintendent and General Freight and Passenger Agent, having both resigned, these offices have been abolished.

**Texas Midland.**—W. J. Newcomb has been appointed General Livestock Agent, with office at Terrell, Tex. Joseph McWilliams, previously Chief Engineer and Superintendent, has resigned.

**Toledo, St. Louis & Kansas City.**—The appointments of C. N. Pratt as Superintendent of the Toledo division, with office at Frankfort, Ind.; L. T. Westrich, Superintendent of the St. Louis division, with office at St. Louis; E. Dresser, Superintendent of Car Service, with office at Toledo; H. T. Porter, General Roadmaster in charge of track, with office at Toledo, were announced last week.

**Western New York & Pennsylvania.**—J. P. Heindell, formerly Superintendent of the Brooklyn, Bath & West End, has been appointed Superintendent of the Pittsburgh division of this road to succeed Edwin A. Fisher, resigned to accept an appointment in the engineering department of the Rochester Water Works. Mr. Fisher has been connected with the company since 1881.

**West Virginia, Central & Pittsburgh.**—The office of General Traffic Agent has been abolished, and G. W. Harrison, who held that office, has been appointed General Passenger Agent, with office at Piedmont, W. Va. W. T. Hunter has been appointed General Freight Agent, with office at Cumberland, Md.

**Wheeling & Lake Erie.**—W. H. Stark has been appointed Master Car Builder of this company, vice F. H. Stark, resigned. The office of Superintendent of Transportation has been removed from Newark to Massillon, O.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Akron & Eastern.**—Between 15 and 20 miles of the railroad are reported to have been completed on the western end of the line from Akron, O. One of the projectors states that the right of way has been nearly all secured to Newcastle, Pa.

**Burlington, Cedar Rapids & Northern.**—The company has made a proposition to construct a railroad from Postville, Ia., to the dolomite building stone quarries, a few miles from the city, if the town will raise \$5,000 of the necessary \$30,000 required.

**Canadian Pacific.**—The grading of the line to the international boundary to connect with the "Soo" line is nearly completed, only five miles being unfinished on June 1. Track laying will be commenced in time to have the line ready for operation as soon as the "Soo" extension to the boundary is completed.

**Cape May.**—Logan M. Bullitt, J. C. Bullitt and their Philadelphia associates in the project for a new road across New Jersey, to reach Cape May, made an inspection trip last week over the Philadelphia & Sea Shore road, which they have purchased from the West Jersey. The road has been constructed from Winslow Junction to Sea Isle City, a distance of 42 miles, but a three-mile section between Corson's Inlet and Sea Isle City will have to be relaid, the track having been taken up. Branching off at Tuckahoe Junction the line leading to Cape May has also been graded and is ready for the ties and rails, with the exception of four miles of the approach to Cape May. The purchasers have already contracted with E. A. Tennis, who built the road, to complete the line from Tuckahoe Junction to Cape May and also put the entire line from Winslow Junction to Sea Isle City in good condition.

**Chicago, Indiana & Eastern.**—The townships of Peru and Jackson, Ind., last week voted a two per cent. tax, which, it is stated, will amount to \$65,000, to aid in building this road from Peru to Muncie, Ind., about 50 miles.

**Chicago, Rock Island & Texas.**—The tracklayers on the Texas extension have reached a point 32 miles south of Bowie, Tex., leaving a gap of about 36 miles between the present terminus and the stockyards in North Fort Worth. The progress of tracklaying has been slow recently, owing to the inability to get ties as fast as required.

**City of Mexico Belt Line.**—The concession and plans of the belt railroad to be constructed around the City of Mexico have been approved by the Board of Public Works of Mexico, and the time of completion of the line extended to Dec. 31, 1895.

**Colorado Midland.**—The rails for the Midland Terminal road have been delivered, and it is announced that the tracklaying will begin at once on the graded section of that new line from Divide Station, Col., where it connects with the Colorado Midland south to the new town of Midland, about eight miles. The end of track will probably remain at Midland for some time, but the officers announce that the grading will be resumed with little delay on the balance of the line to the Cripple Creek mines.

**Duluth Superior Belt.**—This company is the Wisconsin extension of the Duluth Transfer road, which has about 10 miles of line completed and in operation. Eighteen miles of single track line has been surveyed in the city of Superior, Wis. The officers are now securing the right of way, and they expect to close the contract for building most of the road in July or August.

**Duluth Transfer.**—Foley Bros. & Guthrie, of St. Paul, have a contract for about five miles of new track, now building between West Duluth and New Duluth, and in the city of Duluth, Minn. Day K. Smith, of Duluth, is President.

**Duquoin & Murphysboro.**—Articles of incorporation of the Duquoin & Murphysboro Coal & Railroad Co. were filed in Illinois last week. It is proposed to build a railroad from Duquoin to Murphysboro. The capital stock is \$50,000, and the principal office is to be at Duquoin. The incorporators and first Board of Directors are: Walter Q. Hawker, Frank T. Fullon, Dan Onstatt, Jos. C. Mark and Henry F. Linsee.

**Gulf, Beaumont & Kansas City.**—R. J. Downey & Bro., of Houston, Tex., were awarded the contract last week for building the first 25 miles of the road north of Beaumont, Tex. This brings the line to the crossing of the Neches River, near Cook's Bluff. The engineers have completed the location from Beaumont to the river

crossing and are now working north toward Jasper County. The grading will begin this week, and it is said that as soon as the section now under contract is completed the contracts for the balance of the line, about 60 miles, will be given out. The only important bridge on the line is that across the Neches River, about 30 miles from Beaumont, which will have a span of about 250 ft. J. H. Kirby, of Houston, is General Manager.

**Lake Erie & Detroit River.**—This road, which has been in operation for some months to Blenheim, Ont., has recently extended its train service to Ridgetown, Ont., 10 miles beyond Blenheim and 84 miles from Walkerville, Ont., the eastern terminus of the road. Three express trains are now running daily each way over the entire line.

**Metropolitan Elevated.**—The company has commenced condemnation proceedings to perfect right of way for its northwest extension. The route is determined as far north as Milwaukee avenue, as being between Paulina street and Hermitage street to Madison street, between Paulina and Page streets to Lake, and between Paulina and Wood streets to a point near Milwaukee avenue.

**Minneapolis, St. Paul & Sault Ste. Marie.**—Grading outfits are scattered all the way from the Sheyenne River to the international boundary. Work is being rushed by the contractors, Messrs. Linton & Co., of Minneapolis, and the tracklayers have reached the Sheyenne. They will be delayed there for about a week, then the rails will be laid at the rate of two or three miles a day.

It is possible that the line into Bismarck, N. D., will be completed this year, but no decision will be reached in regard to this work until the annual meeting.

**Mobile & Ohio.**—The stockholders, at their recent meeting in Mobile, Ala., voted to authorize the officers to extend the road to Montgomery, Ala., either by purchasing or leasing the Montgomery, Tuscaloosa & Memphis road, which is already partially completed between Tuscaloosa and Birmingham or else by building a new road from a town on the present line near Columbus, the distance to Montgomery being 160 miles.

**Montreal & Western.**—The Canadian Pacific is now operating this line from its junction with that system at St. Therese, Que., about 44 miles to the village of St. Agathe, and by July 1 the company is expected to have the line in operation as far as St. Jausin, Que. It has been reported that the intention is to extend this route to connect with the Ottawa & Gatineau Valley road above the Desert, Que.

**New Boston.**—This branch of the Concord & Montreal will be opened for regular operation on June 22. The line was built last year and is about five miles long from Parker's Station, on the Manchester & North Weare Railroad to New Boston, N. H., connecting with the Concord & Montreal system, by which it will be operated.

**New Roads.**—The Allegheny Iron Co., of Iron Gate, Va., is building 3½ miles of narrow gauge road from Oriskany, Va., on the Craig branch of the Chesapeake & Ohio, to ore mines. The rails and equipment have been delivered, and the company expects to have the road in operation this month.

George S. Good & Co., who have built branches of the Beech Creek road, and of the Pennsylvania in Clearfield County, Pa., have contracted with a local company for building a branch road to connect the Beech Creek road with the town of Lock Haven, Pa. A local committee represented by Wilson Kistler, T. R. Mann, Charles Kreamer and H. T. Harvey has secured subscriptions of \$25,000 toward building the road.

**New York Bay Extension.**—Construction work has been resumed on this branch of the Long Island, and the rails are now being laid between Valley Stream and Hempstead Crossing, six miles. This part of the line will be completed during June.

**New York & New England.**—The new branch from Pascoag, R. I., which was completed on June 1, will be opened for regular traffic on June 11. The new road extends from Pascoag station, the former terminus of the Providence & Springfield in the town of Burrillville, R. I., to a connection with the main line of the above company in the town of Douglas, Mass. The location is entirely within the limits of the two towns named. The junction point on the N. Y. & N. E. main line is between Douglas and East Thompson stations, 2.32 miles west of the former. The length of the extension is 6.4, miles of which 5.21 miles is in Rhode Island and 1.19 miles in Massachusetts. It has been built by the Providence & Springfield, which is leased to and operated by the above company. The contractors for grading, masonry, tracklaying and ballasting, were Ward Brothers of Kennebunk, Me. The girder bridges and wrought iron trestles were built by the Boston Bridge Works from designs by the Chief Engineer, L. B. Bidwell. The bridges consist of two wrought iron trestles, one 333 ft. long and one of 330 ft.; one wooden trestle 204 ft. long and two through iron girders of 41 ft. and 48 ft. lengths. All of the bridges are in Rhode Island. The maximum grade is 52.8 ft. a mile on tangents, compensated on curves. The maximum curve is five degrees.

**Northern Central.**—The company is now engaged in building 10.6 miles of second track between Falls Yard and New Cumberland, Pa. About half a mile of the present line is being straightened, so there is actually 11.2 miles of new track being laid. The contracts for graduation are let to L. B. McCabe & Bros., and F. Redington, of Baltimore. The masonry, bridge erection and tracklaying will be done by the company. There are two iron girder bridges to be built, one at Goldsboro of two deck spans, 40 ft. each, and one at New Cumberland of two half-through spans, 73 ft. each.

**Ohio Southern.**—The Ohio papers print long reports of the alleged plans of this company to build a new line from Springfield through northern Ohio to Toledo, which would parallel the Cincinnati, Hamilton & Dayton. President Saul is quoted as announcing that such a line was proposed, and some work would be done this year. It seems that surveys have been made recently for about 10 miles north of Springfield, but that anything beyond this has been done is not very certain.

**Ontario Roads.**—The railroad subsidy resolutions adopted provide for granting a total of \$332,000 to four roads, all in Eastern Ontario: The Ironton, Bancroft & Ottawa, \$3,000 a mile for 15 miles; the Ottawa, Arnprior & Parry Sound, \$4,000 a mile for 35 miles; the Kingston, Napanee & Western, \$3,000 a mile for 30 miles; the Central Counties, \$2,000 a mile for 40 miles.



**Ottawa, Arnprior & Parry Sound.**—Work on this railroad between Arnprior, Ont., and Renfrew, and west to Eganville, Ont., is being pushed. The approaches to the new bridge over the Madawaska River are now being made. All the masonry of the bridge has been completed, and the builders are only waiting for the iron. The road is completed ready for tracklaying west of Ottawa to Arnprior, 35 miles.

**Philadelphia, Honesdale & Albany.**—W. H. Dimmick and H. Z. Russell, of Honesdale, Pa., the latter President of the company, made a formal application last week with other directors before the New York Railroad Commission for the approval by that body of the proposed route through New York State. The line proposed is from White Haven through Honesdale, Pa., entering New York State at Hancock and extending thence toward Rotterdam, about 130 miles of the line being in New York State. The only action taken by the Commissioners was to order profiles and surveys of the line forwarded to them, and the application will come up at a future meeting.

**Rutledge & Julian.**—The contractors' claims against this short Alabama road are reported to have been settled and the stockholders now hope that the road will be completed during the fall. It is to be only four miles long, and was projected and partly built in 1890 as a branch of the Alabama Midland. J. W. Ivey is the contractor who is to complete the work.

**St. Louis, Guthrie & Western.**—A. E. Smith, of St. Louis, is the projector of this road, which is to start at Guthrie, in Oklahoma Territory. The officers elected are: President, A. R. Smith, of St. Louis; Vice-President, George W. Gardenhire, of Stillwater; Secretary, John Ellis, of Guthrie; and Treasurer, J. W. Lienell, of Guthrie.

**St. Louis Merchants' Terminal.**—The contract for the construction of the Merchants' Terminal Belt Line has been let to the J. Ware Construction Company, and ground was broken this week at the junction of the proposed belt line at Florissant avenue with the Terminal tracks. From there the work will progress westward, then southward and eastward around the city, joining the Terminal tracks again in Carondelet. The street crossings of the road will be all over and under crossings. Maj. C. C. Rainwater, President of the company, says that work will be pushed with all possible speed. It is expected to make a junction with the St. Louis & San Francisco at Lindenwood Station and give that line a terminal into the city other than the Missouri Pacific track.

**Western Maryland.**—Tracklayers are now at work within 2½ miles of York, Pa., on the York extension. The work of construction at present is somewhat irregular, due to the difficulty experienced in securing ties. It is confidently expected that the new line will be in operation by July 4. The branch begins near the Maryland state line at Porter's, and extends northeast to York, about 12 miles.

**Wilkes-Barre & Eastern.**—Chief Engineer R. L. Harris, of the construction company, and Chief Engineer Hartwell, of the railroad, together with the President and other officials, inspected the new line June 2 for the purpose of examining that portion recently completed by Contractor Conway.

**Winona & Southwestern.**—Mason City, Ia., has voted bonds to the amount of five per cent. of the assessed valuation of the property in the city in aid of the Winona & Southwestern. The road is allowed a little over a year to complete its line from Osage City to Mason City, and the work of grading the extension to that place will be begun at once.

**Youngstown & Ohio River.**—This company has been incorporated at Columbus, O., with a capital stock of \$300,000, by C. H. Smith, R. W. Taylor, J. W. Clark, K. E. Baringer and J. N. Richards. The termini of the road are the State line between Ohio and Pennsylvania in Hubbard township, Trumbull county, O., and East Liverpool, Columbiana county, the line passing through the counties of Trumbull, Mahoning and Columbiana. The general offices of the company are to be at Megley, O.

#### GENERAL RAILROAD NEWS.

**Atchison, Topeka & Santa Fe.**—The report of the earnings of the company for April, printed below, includes the figures for the Colorado Midland for the first time.

Month of April:	1893.	1892.	Inc.
Average operated mileage....	7,481	7,478	3
Gross railroad earnings.....	\$3,216,085	\$3,048,519	\$167,566
Operating expenses.....	2,337,136	2,183,048	154,088
Net earnings.....	\$878,949	\$865,471	\$13,478
Other receipts.....	75,000	75,000	.....
Total net earnings.....	\$953,949	\$940,471	\$13,478
Fixed charges (est.).....	919,000	917,000	2,000
Surplus.....	\$34,949	\$23,471	\$11,478

The following statement of earnings for April and ten months of the fiscal year includes the earnings of the St. Louis & San Francisco for those periods:

Month of April:	1893.	1892.	Inc. or dec.
Average operated mileage..	9,345	9,342	3
Gross railroad earnings ..	\$3,912,176	\$3,673,884	I. \$238,292
Operating expenses ..	2,793,545	2,584,743	I. 208,802
Net earnings ..	\$1,118,631	\$1,089,145	I. \$29,486
Other receipts ..	75,000	75,000	.....
Total net earnings.....	\$1,193,631	\$1,164,145	I. \$29,486
Fixed charges (est.).....	1,194,000	1,192,000	I. 2,000
Deficit.....	\$369	\$27,855	D. \$27,486

Ten Months, July 1 to April 30:

Month of April:	1893.	1892.	Inc. or dec.
Average operated mileage..	9,345	9,338	7
Gross railroad earnings ..	\$42,827,923	\$39,416,812	I. \$3,411,111
Operating expenses ..	29,207,123	27,048,338	I. 2,158,785
Net earnings ..	\$13,620,800	\$12,368,474	I. \$1,252,326
Other receipts ..	750,000	750,000	.....
Total net earnings.....	\$13,870,800	\$13,118,474	I. \$752,326
Fixed charges (est.).....	11,910,000	11,920,000	I. 20,000
Surplus.....	\$1,930,800	\$1,198,474	I. \$732,326

**Atlanta & Florida.**—The transfer of the property by the Receiver to the organization committee which purchased the road at foreclosure sale on May 2 last has been effected, and the new company is now operating the railroad. T. W. Garrett remains as General Manager, and no important changes have been made in the organization.

**Chicago & Northwestern.**—The company reports for the year ending May 31:

	1893.	1892.	Inc. or dec.
Gross earnings.....	\$32,953,424	\$31,422,272	I. \$1,531,152
Oper. ex. and charges..	28,208,653	26,502,088	I. 1,706,565
Balance.....	\$4,744,771	\$4,920,186	D. \$175,415
Dividends.....	3,906,561	3,675,735	I. 230,826
Surplus.....	\$840,209	\$1,244,451	D. \$404,242
Surplus West lines.....	57,685	44,749	I. 12,936
Total surplus.....	\$897,904	\$1,289,200	D. \$391,296

**East & West of Alabama.**—This road was sold at Pell City, Ala., on May 29, by order of the United States Circuit Court, and it was purchased by Eugene Kelly, of New York City, one of the largest bondholders and the owner of the outstanding receiver's certificates, which amount to about \$700,000. The road has been under the control of C. P. Ball, as Receiver, since 1888, and since that time the gauge has been changed to standard and many important improvements made. It is reported that the road will now be extended into Birmingham, about 30 miles from Pell City, the western terminus.

**Little Rock & Memphis.**—The United States Circuit Court, of Little Rock, Ark., on May 31 last appointed Rudolph Fink Receiver of this road. The application for a Receiver was made by the Central Trust Co., of New York, on the ground of default in the payment of interest due in March last on the first mortgage bonds. Mr. Fink was the Receiver during the last Receivership, which was ended in 1887.

**Long Beach.**—The Pennsylvania Railroad has abandoned another of its unprofitable New Jersey tributaries, the Barnegat City extension of the above railroad. The road extends from near Long Beach City to Barnegat City, N. J., eight miles. The latter place will only be accessible hereafter by boat from Long Beach City.

**Long Island.**—The Southern Hempstead branch road on Long Island, which is owned by the A. T. Stewart estate, but is not at present operated, has been purchased by the New York Bay Extension Railroad in the interest of the Long Island. The line is six miles long from Valley Stream to Hempstead, and the New York Bay Extension is a branch of the Long Island from Valley Stream now being built.

**Marietta, Hocking & Northern Ohio.**—The Cincinnati, Hocking Valley & Huntington railroad, better known as the "Karshner" railroad, designed for a coal road, has been reorganized under the above name, with the following directors: John Karshner, of Swinehart, O.; D. E. Rose and D. H. Strouse, of Adelphi; L. M. Newsom and C. O. Hunter, of Columbus.

**New York Central & Hudson River.**—The report of gross earnings for May shows that the road earned in May, 1892, \$3,643,402, and in May, 1893, \$4,001,613, or a gain of \$358,210. This large increase in earnings is the result of the ordinary business and operations of the company, as the World's Fair business has not yet been appreciably felt.

**Norfolk & Western.**—Newspaper dispatches from West Virginia last week stated that a court in that state had appointed Z. T. Vinson temporary receiver of the Norfolk & Western road in that state; that is, its Ohio & West Virginia extension. President Kinball says that these legal proceedings are not of the slightest importance; the only foundation for them is the claim of a firm of contractors for \$29,000 for work done on the Ohio extension. This amount the company had agreed to pay as soon as it was indemnified against claims for labor or material. Pending such a settlement the firm failed, and the assignee had brought attachments against the property in West Virginia. This week the appointment of a receiver was rescinded, the company having deposited the amount of the claim in court.

The company offers to its stockholders for pro rata subscription \$5,000,000 of the 100-year 5 per cent. gold bonds now in its treasury at 105. The subscribers will receive with each \$1,000 bond 10 shares of preferred stock as a bonus. The entire issue of bonds is underwritten by a banker's syndicate. This operation will increase the amount of preferred stock outstanding, \$5,000,000 to \$48,000,000, and the amount of 100-year bonds to about \$15,000,000. The proceeds of this sale will pay off the entire floating indebtedness of the company, provide for the redemption of its debenture bonds when they mature on Jan. 1 next, and leave about \$700,000 in cash in the treasury.

**Port Royal & Western Carolina.**—The suits of the minority stockholders and the intervening suits for the appointment of an independent receiver in place of Receiver Comer, of the Central of Georgia, were decided on June 3, by United States District Judge Simonton, against the Central of Georgia. John B. Cleveland was appointed Receiver of this road and of the Augusta & Knoxville, both of which have heretofore been operated by the Central of Georgia, and Receiver Comer of that company has been ordered to transfer all of the property to the new Receiver.

**Utster & Delaware.**—This company has obtained control of the Stony Clove & Catskill Mountain and the Kaaterskill railroads by lease. The latter two lines of railroad are the most direct routes to the large Kaaterskill Hotel, in the Catskill Mountains, and have for many years been operated as separate corporations.

#### TRAFFIC.

##### Traffic Notes.

The Texas Car Service Association will enforce demurrage rules at 600 stations. The regulations of the Association have been referred to and approved by the Railroad Commissioners of Texas.

It is announced from Washington that the Treasury Department will soon issue an order requiring that immigrants from Canada and Mexico comply with all laws regulating immigration, quarantine and customs now in force at seaports, including the requirement that immigrants enter only between 6 in the morning and 7 in the evening.

The Southern Pacific has made another reduction in freight rates from New York to Pacific Coast points. The Canadian Pacific, a few weeks ago, reduced rates to the basis of \$2.76, first class, to meet the Southern Pacific rates by boat and rail, via New Orleans; and now the latter has reduced rates to the basis of \$2.48 first class. Many of the commodity rates are \$1 or less per 100 lbs. The Southern Pacific has made these reductions largely to draw business from the Columbian Steamship Line, operated in connection with the Panama Railroad. It is said that the negotiations be-

tween the Columbian and the Pacific Mail have been concluded and that peace will be restored; that the Pacific Mail will confine itself to the Pacific Ocean, and that its three vessels running between New York and Aspinwall will be chartered by the Columbian Line.

#### Chicago Traffic Matters.

CHICAGO, June 7, 1893.

Affairs in the Western Passenger Association territory have taken a more favorable turn and the outlook is good for the early settlement of the differences now existing. It was a foregone conclusion when the Santa Fé put in force the \$37.50 rate from Colorado and \$17.50 from the Missouri River that the "agreed" schedule of World's Fair rates from Western territory was bound to be revised, and that when that was done and all the roads were united on this point that there would be a chance to put in operation the new agreement, and not until then. The action of the Santa Fé was promptly met by the Alton, which line also put in effect the \$17.50 rate to the Missouri River on west-bound business and one-half the round trip rate for one-way business. The other Missouri river lines prepared to meet this action, and the Albert Lea route gave notice of an intention to reduce rates from St. Paul. On June 3, a meeting of all lines was held here, the Santa Fé, Alton and Minneapolis & St. Louis being represented, and a resolution was passed adopting a revised schedule of World's Fair rates and agreeing that the round-trip rates be put into effect at once and the one-way rates as soon as it can be legally done. The meeting then adjourned until Monday, each line present pledging themselves to be present at the adjourned meeting and take up the new agreement. The meeting on Monday proceeded to take up the articles of the agreement serially and continued yesterday without completing their consideration. The revised schedule of World's Fair rates is as follows:

	Round trip.	One way.
From Kansas City, etc., to Chicago.....	\$17.50	\$9.25
From Chicago to Kansas City, etc. ....	18.50	9.25
From Omaha, etc., to Chicago.....	17.50	9.25
From Chicago to Omaha, etc. ....	18.50	9.25
Between Kansas City and St. Louis.....	11.00	6.00
Between Chicago and St. Paul or Minneapolis..	17.25	8.50

Corresponding reductions are made to other points affected by the above rates. The \$37.50 rate established from Denver and Colorado common points to Chicago and return remains in effect.

The General Managers of the Central Traffic Association were unable to complete the business on the call at their meeting, owing to the absence of some of the representatives, and the meeting adjourned without having settled any of the more important questions under consideration.

Chicago lines have under consideration a plan for the establishment of a general clearing-house for the settlement of balances and the collection of freight bills.

Transcontinental freight rates continue in a demoralized condition, owing to the competition between the Southern Pacific and Canadian Pacific, between New York and San Francisco, primarily due to the competition of the clipper ships which led the Southern Pacific to make large reductions. The Santa Fé has announced its policy to make as low rates westbound from Chicago as are made from New York. The rates now quoted from Chicago are:

	1	2	3	4	5
	\$2.48	\$2.19	\$2.00	\$1.70	\$1.70

These rates show the following reductions from tariff on the first five classes:

	1	2	3	4	5
	92	51	40	20	0

Corresponding reductions are shown in the lettered classes.

Sheboygan, Wis., has been added to the list of points taking differential rates on traffic breaking bulk via water, across Lake Michigan in connection with rail routes east.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending June 3 amounted to 52,599 tons, against 51,485 tons during the preceding week, an increase of 1,114 tons, and against 49,006 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W't to June 3.	W't to May 27.
	Tons. P. c.	Tons. P. c.
Michigan Central.....	6,763 12.9	7,342 14.3
Wabash ..	1,547 2.9	2,319 4.5
Lake Shore & Michigan South.	10,356 19.7	10,118 19.7
Pitts., Ft. Wayne & Chicago..	8,448 16.1	7,423 14.4
Pitts., Cin., Chicago & St. Louis	5,150 9.8	4,497 8.7
Baltimore & Ohio ..	3,130 6	3,442 6.7
Chicago & Grand Trunk.....	3,935 7.5	6,075 11.8
New York, Chic. & St. Louis..	5,705 10.9	4,261 8.3
Chicago & Erie.....	5,951 11.3	4,276 8.3
C., C. C. & St. Louis.....	1,586 2.9	1,729 3.4
Totals ..	52,559 100.0	51,485 100.0

Of the above shipments 2,675 tons were flour, 20,411 tons grain and millstuff, 7,237 tons cured meats, 11,900 tons dressed beef, 1,644 tons butter, 2,163 tons hides and 5,617 tons lumber. The three Vanderbilt lines carried 43.5 per cent., the two Pennsylvania lines 25.9 per cent. The Lake lines carried 86,770 tons, against 65,565 tons during the preceding week, an increase of 22,205 tons.

#### Corn Sent to Mexico.

Gen. W. T. Sutton, Consul General of the United States for Northern Mexico, has made a report showing the amount of corn that went into Mexico during the recent corn famine in that country. He says: "The importation of United States corn into Mexico in 1892 was one of the most interesting and important events which has ever occurred between the two countries. Had it not been for our nearness and unlimited supply thousands of the very poor of Mexico must have died for lack of food. As it was, there was much severe suffering, and the effects will be felt for years."

The report shows that, during the twelve months of 1892 and January and February, 1893, there was imported from the United States into Mexico about 6,000,000 bushels, say, 10,000 cars. Allowing for imports at Matamoros and ports on the Gulf and Pacific, General Sutton calculates the crop failure all over Mexico as from 20 to 40 per cent. The Texas roads received about \$1,324,806 for hauling this corn to the border. The Mexican railroads earned the following sums for hauling the corn: Mexican National, \$720,000; Mexican International, \$370,000; Mexican Central, \$228,000; Sonora Road, \$38,000.